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BUREAU OF
ENTOMOLOGY AND PLANT QUARANTINE
NEWS LETTER

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VOLUME VI no. 1 Jan 1939

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UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

NEWS LETTER

FOR NOVEMBER 1938

 Vol. VI, No. 1 (Not for publication) January 1, 1939

FREDERICK HARRIG TUCKER

Frederick Harrig Tucker, chemist in the Division of Cotton Insect Investigations, died on November 22, 1938, at Starkville, Miss., from complications following pneumonia. Interment was at Leesburg, Va. His wife, Viola Virginia Tucker, and a son, Frederick Jr., a senior at the Naval Academy, survive him.

Mr. Tucker was born in Madisonville, Ky., on June 29, 1879. He received his B. S. degree in chemistry from the University of Kentucky in 1909. He had wide experience in inorganic chemistry and chemical engineering, having served with the soil and drug laboratory of the Kentucky Experiment Station while a student; with the technological branch of the Geological Survey in analyzing cements and alloys used in the construction of the Panama Canal, 1909-10; with the Bureau of Standards as research and analytical chemist on iron, steel, and alloys, 1910-20; with a mining company on research on ores containing copper, lead, zinc, and other metals, 1921; and with the Bureau of Public Roads on methods and apparatus for testing bituminous road materials, 1921-24. He came to the Bureau of Entomology in 1924 and was stationed at the Tallulah, La., laboratory until transferred to State College, Miss., in 1933. His work relating to cotton insects consisted of chemical and physical testing of calcium arsenate and other insecticides used for boll weevil control; their distribution and effective doses when applied by airplanes; and, in later years, research on the effect of arsenicals on soils and crops.

FRUIT INSECT INVESTIGATIONS

Nicotine spray for codling moth control may save growers money.—Nicotine sulphate used in place of lead arsenate for controlling the codling moth may actually reduce the cost of producing apples in the Pacific Northwest instead of increasing it, as has been commonly believed. Figures based on actual costs in a number of orchards where spraying was done experimentally or by growers have been compiled by E. J. Newcomer, of the Yakima, Wash., laboratory. At current prices for apples, and using the picked box with culls out as a basis, there may be a net saving of several cents a box. The development of the nicotine-bentonite formula has made this possible. In experimental orchards the additional cost of nicotine, used with bentonite or mineral oil, over the cost of lead arsenate has been $7\frac{1}{2}$ cents per box. This might have been 12 cents per box with a light crop, but some growers

have used the nicotine program at an additional cost of only 3 or 4 cents per box. The apples had an increased value of 4 cents per box because they had 20 percent less stings than apples sprayed with lead arsenate. This increase might average 3 cents. The apples also were more highly colored, giving them an additional value of 2 cents per box. Apples sprayed with nicotine can be packed without washing, and they may or may not require wiping. The latter cost is 2 cents per box, the former 6 cents, hence the saving here is either 4 or 6 cents per box. When the arsenic tolerance made washing necessary, most growers had to have their fruit packed at central plants, as they could not afford to buy the washing machinery. With a nicotine program, however, growers can again pack their own fruit at a saving, by their own estimate, of 3 to 5 cents per box. Striking an average of these figures, there should be a saving of 3 cents on account of stings, 1 cent on account of color, 5 cents on account of cleaning, and 4 cents on account of packing, or a total average saving of 13 cents per box. The minimum would be 8 cents and the maximum 17 cents per box. Comparing these figures with the additional cost for nicotine of 3 to 12 cents per box, an average net saving of 5 cents per box could be realized. In the above figures, no account was taken of savings in the control of red spiders, aphids, and leaf hoppers, or of depreciation in fruit caused by the washing treatment.

Derris and cube of little value as stomach poisons against Japanese beetle.—W. E. Fleming and E. D. Burgess, of the Japanese beetle laboratory at Moorestown, N. J., have reported on tests conducted during the summer of 1938 with various materials as stomach poisons against Japanese beetles. Comparative tests were made with derris and cube having the same rotenone content (4 percent) and practically the same percentage of total extractives (14 and 16 percent, respectively). Neither material appeared to have any appreciable value as a stomach poison. Derris, however, has a high rating as a repellent to the beetle, and the tests indicated that for repellent purposes, either cube or timbo could be substituted for derris, provided the rotenone content of the materials was about 4 percent and the total extractives about 16 percent.

Propagation of imported dipterous parasite of Japanese beetle.—J. L. King and L. B. Parker, of the Moorestown laboratory, have reported on propagation of Dexia ventralis Ald. during 1938. Between 1926 and 1936, liberations of this species were made at 13 points in New Jersey, Pennsylvania, Maryland, Long Island, N. Y., and Illinois. Of these, only one colony is known to have survived--the colony at Haddonfield, N. J. In order to insure availability of material for further releases as the Japanese beetle spreads into areas varying in climatic and other conditions, laboratory propagation of field-collected Dexia females was carried on this season. Only seven first-brood Dexia females were collected at the Haddonfield colony between June 8 and July 8, 1938. From this original stock, material was reared through successive broods so that it was possible to release 162 males and 95 females of the third-brood adults at Haddonfield to strengthen the colony there, and also release 302 males and 224 females at a selected site at Marple, Pa., in an effort to establish a new colony; the balance of the third-brood material is being carried over in hibernation at the laboratory as parasitized host larvae for spring colonization.

Flight habits of Ahasverus advena (Waltl).--This small beetle, known as the foreign grain beetle, occurs in relatively small numbers in stored raisins. It was present in a sample of 45¹/₂ pounds of raisins collected on June 24, 1938, at the rate of 1,088 per ton. Short-interval collections from a rotary net operated in a raisin storage yard by Dwight F. Barnes and George H. Kaloostian, of the Fresno, Calif., laboratory, showed that the species is on the wing most abundantly in the evening. The following record shows the evening flight on May 13:

Time (p.m.) ^{1/}	Temperature	Relative humidity	Light	A. advena taken
	°F.	Percent	Foot candles	Number
6:45 -----	91	35	100.00	4
7:00 -----	90	36	45.00	26
7:15 -----	88	40	11.00	88
7:30 -----	88	40	1.00	62
7:45 -----	87	40	0.25	38
8:00 -----	85	44	0	26
8:15 -----	85	44	0	11
8:30 -----	85	44	0	14
8:45 -----	85	44	0	11
9:00 -----	85	41	0	1

^{1/}Sunset was at 6:58.

The catches recorded during the season were as follows: April (14-30), 1,520; May, 9,663; June, 2,983; July, 2,915; August 1,110; September, 1,238; October, 624.

Insect survey in peach orchards.--In the period from May 21, 1936, to November 1, 1938, the mobile laboratory unit No. 1, W. F. Turner, in charge, with headquarters at Little Rock, Ark., covered a total of 42,373 miles in the survey of insects that occur in peach orchards. The travel extended west from the Carolinas through Georgia, Alabama, and Mississippi to western Texas; north through Arkansas, Tennessee, Missouri, Illinois, and Indiana, into Michigan; and east through Kentucky, West Virginia, Virginia, and Pennsylvania to the Eastern Shore of Maryland. Collections have been made in peach orchards in 17 States, both where the phony disease is known to spread naturally and where the disease does not occur or, if it has been reported, there is no evidence of natural spread. Fifteen localities in 12 of the Southeastern and Middle Western States have been visited regularly and in each of these localities 2 collection stations have been established. A total of 87 visits have been made to the regular collection localities, or an average of 5.8 visits to each collection station. Twenty-four visits were made to 16 supplemental collection localities in 5 States where 69 definite collection stations were designated for the survey and for future comparative collections, an average of 1.5 visits to each supplemental station. At the 31 localities in the 17 States, representing 99 collection stations, a total of 644 collections were made, yielding 15,298 accessions, representing up to October 15, 1938, 1,309 species that have been named by the Division of Insect Identification.

MEXICAN FRUITFLY CONTROL

No Mexican fruitflies trapped in November.---Ordinarily some Mexican fruitflies are trapped in the lower Rio Grande Valley in November, but this season is an exception. Of the approximately 38,000 trap inspections made during the month, not a single adult Anastrepha ludens Loew was taken. Several other Anastrepha species were in the area, however. Traps took A. serpentina Wied., A. mombin-praeoptins Sein, A. species "Y", one unidentified new species, and many specimens of A. pallens Coq. Grove inspections likewise gave negative results so far as A. ludens was concerned. Extremely dry weather continues to delay the development of the present citrus crop, although irrigation is being resorted to.

CEREAL AND FORAGE INSECT INVESTIGATIONS

White-fringed beetle shows decrease in Florala, Ala., area.---According to H. C. Young, on November 24, 1938, the annual fall survey in the Florala area showed the larval population of Naupactus leucoloma Boh. to be much reduced, as compared with that recorded in November 1937. The average population of grubs per square yard, as recorded in cotton, corn, and peanuts in 1937, was 184, whereas in 1938 this had become reduced to 90 per square yard. A high population recorded in fields of early corn in 1938 was believed to have been induced by a heavy growth of cocklebur in such fields.

Naupactus n. sp. in Gulfport, Ala., area has long emergence period.---According to Mr. Young, the emergence of Naupactus n. sp., a form closely related to the white-fringed beetle, in cages placed in infested fields continued throughout a period of almost 5 months. First emergence was observed on May 22 and adults were still emerging on October 10. The greatest amount of emergence occurred between June 21 and August 9, when more than 80 percent of the total was recorded. Apparently this species deposits a considerably smaller number of eggs than does N. leucoloma.

Variation in viscosity of oils unimportant in control of Heliothis obsoleta F. in ear corn.---According to results reported by G. W. Barber in his work with the injection of mineral oils into the tips of ears of sweet corn for protection against the ear worm, there was no important difference in the efficiency of oils varying rather widely in viscosity. The oils used were purchased in the open market and were produced by two different manufacturers. Their viscosity ranged from 125-135 to 335-345, Saybolt test, and they were of the quality ordinarily used for internal medication. In view of the greater fluidity of the oils of lower viscosity, it seemed apparent that they could be used to advantage because they would flow more readily through the long spout and small aperture of the injection apparatus.

JAPANESE BEETLE CONTROL

Evergreen-bough inspection nets 829 egg clusters.---The record egg cluster removal in connection with this season's inspection of evergreen-bough material shipped from the New England area was 500 egg clusters found on 5 tons of evergreen boughs inspected at Cape Porpoise, Maine. Two hundred egg clusters were taken from a ton of boughs examined at Freeport, Maine.

Approximately 100 egg masses were found on 2½ tons of boughs inspected at Pownal, Maine. At Shapleigh, Maine, 25 egg clusters were found on 5 tons of boughs. Two egg clusters each were found on bough material inspected at Bath, Maine, and Topsfield, Mass. The boughs inspected at Cape Porpoise, Freeport, and Shapleigh were used in the manufacture of Christmas wreaths for later sale to customers outside of the regulated area. After manufacture from the inspected boughs, the wreaths were sealed for ready identification when they are presented for certification to nonregulated territory.

Egg clusters destroyed during forest-product inspections.---During the month, 27 egg clusters were removed from 5 carloads of lumber inspected at Danbury, N. H., preparatory to transportation to New Haven, Conn. Inspection of 2 carloads of lumber at Deering Junction, Maine, going to Camden, N. J., netted 11 egg masses. Another inspection of a single carload of lumber at Deering Junction yielded six egg clusters on material going to Buffalo, N. Y. Six egg clusters were removed from a carload of paving blocks inspected at Suncook, N. H., for shipment to Troy, N. Y. A small shipment of nursery stock also disclosed two egg clusters when inspected at South Windham, Maine, for shipment to Evansville, Ind. Eight additional egg clusters were taken from miscellaneous shipments of logs and lumber. Inspection of 1,500 1-foot birch logs at Boston resulted in the removal of 4 egg clusters. These logs are novelty containers for ultimate consignment to nonregulated points.

Christmas-tree inspection delayed.---Inspection of Christmas trees in the lightly infested gypsy moth area was considerably delayed, owing to the warm weather prior to November 25. It was too warm to haul out of the woods the trees that had been cut, since they would lose their leaves when assembled for inspection. In Maine, crews engaged in cutting Christmas trees abandoned the woods because of the presence of swarms of mosquitoes. When cold weather finally arrived on November 24, it was accompanied by a heavy fall of snow. Twenty temporary inspectors were employed for the period of Christmas-tree and greenery inspection.

Fox-farm buildings carry gypsy moth infestation.---Information was furnished by A. F. Burgess, of the Division of Gypsy Moth and Brown-tail Moth Control, that a crew of gypsy moth scouts had located 155 old egg clusters and 83 new masses on kennels, runs, lumber, and other equipment of a fox farm which had recently moved from Dover, Mass., in the generally infested area, to Cummington, Mass., in a lightly infested section.

Scouting of permitted nurseries completed.---Surveys for gypsy moth infestation in nurseries in the Manchester, Conn., area allowed to ship under gypsy moth permit were finished in November.

Complete inspection of evergreen boughs.---Most of the inspection of evergreen-bough lots in western Massachusetts and southern Vermont was completed by mid-November. Baled boughs were then certified for shipment into the States of New York, Ohio, and Missouri. Several gypsy moth egg clusters were located on the bough lots. Cutters avoided the sections in which these infestations were found.

Recent confirmations of infected elms.--Early in November a laboratory report was received confirming the first Dutch elm disease infected tree to be found in Newton Township, Fairfield County, Conn. This tree was first reported by an autogiro scout. This infection resulted in an extension of 75.91 square miles in the infected zone in Fairfield County and the addition of 50.84 square miles in the New Haven County protective zone. Re-collection of twig samples from an elm originally tagged in September resulted in reconfirmation of a tree in Howell Township, Monmouth County, N. J. This confirmation places Howell Township and the Borough of Farmingdale within the infected zone and adds 63.70 square miles to that area. Another tree, confirmed in the town of Stanford, Dutchess County, N. Y., is located approximately 5 miles east of the nearest diseased tree and is $6\frac{1}{2}$ miles south of the Columbia County line, 12 miles west of the Connecticut line, and 15 miles southeast of the Massachusetts-New York State line. The latter elm was a girdled tree, heavily infested with bark beetles, many of which had already emerged. Notice was received from the laboratory on November 10 of the confirmation of a tree located in Upper Makefield Township, Bucks County, Pa. This makes a total of 10 trees confirmed in Pennsylvania. The first 1938 confirmation in the Cumberland, Md.-Wiley Ford, W. Va. area was received in mid-November. This was a twin tree with two 10-inch leaders, located in woodland in the vicinity of a previously confirmed tree, 5 feet from the Potomac River at Wiley Ford, W. Va. Confirmation of an elm in Hamptonburgh Township, Orange County, N. Y., increased the New York work area to 3,955 square miles. Another New York confirmation involved a tree in the township of LaGrange, Dutchess County. A diseased tree reported from Hamilton County, Ind., late in the month is about 1,200 feet from the only other confirmed tree in that county. When removed as a dead and dying tree, a sample was taken from the roots. This was later cultured as Graphium.

Autogiro activities.--Regular autogiro operations on Dutch elm disease scouting were concluded on October 19. Other activities have occupied the autogiro unit since that date. On October 26, giro NC-2740 cleared the USDA airport at Preakness, N. J., en route to Keene, N. H., to engage in a cooperative survey to map and estimate the storm damage to elm and white pine in that vicinity. En route to Keene, this ship was flown along a route west of the Connecticut River north from Waterbury, Conn., to South Londonderry, Vt. Small groups of damaged elms were observed. From Londonderry, Vt., scouting was continued in a southeasterly direction to Keene. No storm damage was apparent in the vicinity of Keene, although the elms in Keene were severely damaged. While en route from Keene to the home airport, another strip west of the Connecticut River was scouted from Brattleboro, Vt., to Waterbury, Conn. Very little storm damage was observed. During November the same autogiro assisted in a timber-damage survey conducted in the vicinity of Concord and Keene, N. H., by the New Hampshire State Fire Hazard and Timber Salvage Commission. Up to December 3, the crew of the large ship had completed approximately 2,000 square miles of territory on the survey. One of the smaller autogiros, NC-12684, also assisted in this survey, first operating from Keene until deep snow there forced a transfer to the Concord airport. Late in the month, plans were made to dispatch autogiro NC-13189 to Brownsville, Tex., to engage in autogiro scouting for the Division of Pink Bollworm and *Thurberia* Weevil Control.

Bark-beetle survey.---A survey for hibernating Hylurgopinus rufipes Eich. was concluded in the Cumberland, Md.-Wiley Ford, W. Va., area on November 18. Most of the beetles found and submitted to the laboratory for culturing were collected within from 6 inches to 3 feet of the ground. A plot located 1 mile southeast of a trap log, in which beetles of this species were found to be carrying the disease fungus, was checked for hibernating tunnels, galleries, and beetles. Scolytus multistriatus Marsh. is not abundant in this area. Galleries of this species found in the course of the work were submitted to the laboratory along with those of H. rufipes.

Certification activities.---Nursery activities throughout the Japanese beetle regulated area were quite spotty during the month. Movements of stock were quite light in the New York City area, notwithstanding the fact that the fall shipping season continued until Thanksgiving. Occasional shipments were certified, but most of the business was local and a good part of that was centralized on the New York World's Fair grounds.

No bidders for classified nursery.---Plant material growing in a greenhouse range of 6,500 square feet, comprising 14 houses, was offered at public auction at Mt. Washington, Baltimore, Md., on November 4. Although the sale was attended by hundreds of nurserymen and greenhouse men from Maryland, Delaware, Pennsylvania, Virginia, and the District of Columbia, not a single bid was received. Failing to dispose of the stock, the establishment is being permitted to remain in operation under Federal regulation, the Government, having been the mortgagee, ordering the auction.

Post-season Japanese beetle adult finds.---An inspector brought in a live male Japanese beetle on November 8, collected on zinnia at Rumson, N. J. Another "last" beetle was found November 7 on a rose growing in a yard in Swarthmore, Pa.

Radio quips.---Following a tune on a compressed air sprayer by one of the amateurs on Major Bowes hour, the Major exclaimed, "Bring that out to my house next July and spray for Japanese beetles." Ben Bernie, in his November 13 broadcast, remarked about the Japanese beetles eating the crops on his farm in Floirda--but in this instance his locale was mixed.

FOREST INSECT INVESTIGATIONS

Scale insects cause extensive damage to young pines.---In examining the condition of young ponderosa pine stands on the Malheur National Forest in Oregon, Junior Foresters Kachin and Welsh recently discovered an area of over 400 acres with overstocked 30- to 60-year-old ponderosa pine which was so badly injured by some insect or disease that no crop trees could be found. The main leaders and laterals were badly deformed, and the twigs showed cankerlike swellings. The needles were pale and short and many tips were killed. It was obvious that the injury had been progressing for several decades. Examination of the galled twigs, by F. P. Keen, of the Portland, Oreg., laboratory, disclosed the presence of numerous scale insects, apparently a species of Matsucoccus. This is the first case that has come to the laboratory's attention in the Pacific Northwest of extensive and serious forest damage resulting from the work of this genus.

Western pine beetle infestation declines.--All early reports from the regional pine beetle survey conducted in July, August, and September showed a marked increase in the summer generation of western pine beetle throughout the ponderosa pine forests of Oregon and Washington, according to Mr. Keen. Notwithstanding higher precipitation and better tree growth, timber losses were increasing everywhere. The situation was both alarming and disconcerting because it was obviously impossible to apply control measures throughout the entire ponderosa pine region in one season. Fortunately, late cruises in October and November showed that a sharp drop in infestation had occurred between the summer and winter generations. Similar breaks in infestation occurred in 1923 and 1928, also outstanding years of good tree growth. Evidently, increased tree resistance does not make itself felt until late in the season.

Hemlock looper flight reported.--Mr. Keen also reports that the hemlock looper, a serious defoliator of western hemlocks, has again been noted in abundance in the State of Washington. On September 29 district ranger D. J. Stoner observed a large number of moths in flight along the South Fork of the Stikuanish River. No defoliation was observed. Approximately 10 years ago the last outbreak occurred in this vicinity, so this may be just the beginning of another epidemic, as these insects seem to come in 10-year cycles.

Extremely low temperatures fail to destroy mountain pine beetle larvae.--Tests relative to the development of cold-hardiness, or the resistance of mountain pine beetle larvae to low temperatures, are again being conducted at the forest-insect laboratory at Coeur d'Alene, Idaho. As the low-temperature equipment did not provide temperatures sufficiently low to produce larval mortality when full cold-hardiness had been developed, dry ice was added to the cabinet to increase its efficiency. This method provided a temperature of 40° below zero. However, mountain pine beetle larvae from white pine, after being exposed to this temperature for 2 hours and 15 minutes, failed to show any mortality that could be credited to the low temperatures. Although there was a 10-percent mortality, the lack of resistance of these few larvae apparently resulted from injuries received while being removed from the logs.

Forest insect surveys, Clearwater and Kootenai National Forests.--J. C. Evenden, Coeur d'Alene, reports the completion of forest-insect surveys on the Clearwater National Forest and adjacent private holdings, and on the Kootenai National Forest, in Idaho and Montana. Although in these two areas there is an infestation of the mountain pine beetle distributed throughout all of the white pine stands, for the most part it is not above that which is considered as a normal condition. However, in both forests there are several so-called "hot spots" of infestation that will require treatment in the spring of 1939. The treatment of the infested trees on these areas will require approximately \$35,000. Of this amount, \$25,000 will be spent on the Clearwater National Forest and \$10,000 on the Kootenai National Forest.

Barkbeetle control project on Medicine Bow National Forest completed.--According to J. A. Beal, Fort Collins, Colo., control work by the Forest Service against the Black Hills beetle (Dendroctonus ponderosae Hopk.) on

the Medicine Bow National Forest, in southern Wyoming, has been practically completed. Only about 1,200 infested trees were spotted and treated this year as against more than 12,700 trees on the same area last year. This is a reduction of slightly over 90 percent in the infestation from last year and is a remarkably good record of control. Some 300 infested trees were also treated on a portion of the Hayden Division of the forest, in an area not covered by treating last season. During this year's work it was found that there was practically no reinfestation of the forest from the heavily infested Elk Mountain area, which is situated not more than 5 miles from the north boundary of the Medicine Bow National Forest.

Apparent rise in Black Hills beetle infestation in southern Utah.--

Donald De Leon, Fort Collins, reports a puzzling situation in connection with the Black Hills beetle outbreak at Bryce Canyon National Park, Utah. With 2 years of control work on the entire infested area and a reduction of 60 percent in the number of infested trees after the first year of control, it has been found that the number of infested trees the past season has increased. Although at first glance it looks like an increase in the beetle population, there actually appears to have been a reduction, for the beetles the past season have concentrated on much smaller trees than in previous years and the attacks appear to be lighter. A similar situation prevails on parts of the adjacent Powell National Forest where control work has likewise been done in the past 2 years. It will be interesting to follow up this infestation next fall to find out what actually has happened in this area.

Matsucoccus scale causes severe injury to pines in Pennsylvania.--

T. J. Parr, of the New Haven, Conn., laboratory, reports that the first week in November was spent in recording data on condition of trees in the Matsucoccus plots at Mont Alto and Mount Union, Pa. In one sample plot in a 19-year-old pitch pine plantation at Mont Alto, 43 percent of all the trees in the plot lost their leaders this year. Of the 23 dominants on the plot, 3, or 13 percent, had leaders killed; 57.5 percent of the codominants had leaders killed back this year, as did 50 percent of the intermediates and 37.5 percent of those classed as suppressed. In the same plantation there is evidence, from crooked trunks, that the insect has been active in killing leaders on trees in all crown classes for at least 8 years. In another plot, in natural reproduction of short leaf pine at Mont Alto, 63.6 percent of the trees attacked by the insect this year had leaders killed. Data from a very heavily infested pitch pine plot near Mount Union show that 74.2 percent of the trees lost leaders this year. This plot is so heavily infested that the trees have practically ceased to grow. Many of them have no new growth except that put out as adventitious shoots and this year most of those were killed also.

Cryolite and barium fluosilicate successfully used in concentrated form.--S. F. Potts, New Haven, reports that, although cryolite and barium fluosilicate are relatively cheap insecticides, they have been considered unsatisfactory for the control of forest and shade tree pests because they will cause injury to tender foliage and because 0.25 inch of rain will remove from 95 to 98 percent of the deposit. However, the past season's work showed that an adhesive oil or casein could be incorporated in mixtures containing cryolite when triethanolamine is added to the water in the spray. When applied with special equipment, in the form of concentrated mixtures

with adhesives, over half of the cryolite and barium fluosilicate remained after 6 weeks' weathering, during which period 5 inches of rain fell, and no plant injury resulted.

Papers submitted on insects attacking elm.--C. H. Hoffmann, of the Morristown, N. J., laboratory, has submitted two short papers for publication. One is entitled, "Additions to Annotated Lists of Insects Reared from Elm Bark and Wood." It lists 91 species, principally Coleoptera, Hymenoptera, and Diptera, and supplements 2 lists published by other authors. One of these lists, by L. L. Pechuman, appeared in Volume 32 of the Bulletin of the Brooklyn Entomological Society, and the other, by B. J. Kaston, appeared in Bulletin 408 of the Connecticut Agricultural Experiment Station. The need of ascertaining what insects breed in elm is important in connection with the Dutch elm disease eradication program, because of the actual or potential role they may play as carriers of the causative fungus. The other paper by Mr. Hoffmann is entitled, "Observations on the Biology of Saperda tridentata Oliv. and Magdalis arvicollis Say." In the studies on which this paper is based special attention was given to the feeding and oviposition activities of these two species of Coleoptera that commonly attack elm, inasmuch as it was thought that through these activities they might serve as inoculation agents of the Dutch elm disease fungus.

Chemically treated elm trees examined.--R. R. Whitten, Morristown, has reported on the results of experiments conducted during 1938 in which living elm trees were treated with chemical solutions for the purpose of killing the trees and preventing subsequent bark beetle attack. Sample trees were selected in large field plots treated with copper sulphate solution by the Bureau's Dutch elm disease eradication unit. Some of these trees were treated in October 1937, others in May 1938, and the remainder in July 1938. The extent to which the trees had been killed by the treatment was noted and they were cut down, debarked, and examined for bark beetle attack. The trees were satisfactorily killed and over 98 percent of the bark area was found to be free of bark beetle galleries. Both species of elm bark beetles (Scolytus multistriatus and Hylurgopinus rufipes) were concerned in the very limited amount of attack found. In other field tests Mr. Whitten found ammonium bifluoride solution to be fully as satisfactory as copper sulphate solution in killing elm trees and preventing subsequent bark beetle attack. The ammonium bifluoride solution was applied while the trees were in leaf.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Gypsy moth scouting conditions range from ideal to impossible in November.--Excellent progress was made in gypsy moth scouting work during the first half of November, as scouting conditions were ideal; however, a heavy snowfall on November 25 temporarily halted the progress of the work. The heavy fall of snow rendered ground conditions ideal for burning brush, and most of the unskilled laborers were immediately employed on that phase of the control program.

Scouting work in swamps postponed.--Ordinarily there is a season during the summer or fall months during which swampy areas can be scouted. This year there was more than the normal amount of rain, and many swampy sections did not dry sufficiently to permit scouting. Many of these large areas cannot be scouted until they freeze.

United States and Canadian Governments cooperate in gypsy moth work.—Late in October two regular gypsy moth employees were temporarily detailed to special duty in Washington County, Maine. One of the men conferred with the Canadian official in immediate charge of gypsy moth scouting and treatment work in progress in the Canadian Province of New Brunswick, and completed arrangements for making joint observations in the section of Washington County adjacent to the Canadian border to determine the favorability of the woodland growth in that locality to gypsy moth development. As a result of these observations it was found that a very large percentage of the woodland growth in this territory is coniferous. Only five relatively small areas were discovered within which 50 percent of the growth consisted of favored food species. It is evident from these observations that the section of Washington County situated near Calais is not, as a whole, subject to severe infestation by the gypsy moth. While the survey was in progress the other Federal employee instructed the Canadian force in the proper use of ropes in tree climbing. Scouting was then begun at the sites of infestations discovered during the fiscal year, 1938 in Princeton and Calais. Scouting in 20-foot strips will be continued until an area of at least 1/2 mile in radius around each infestation has been examined. The work in Princeton was completed late in November, and no gypsy moth infestations were discovered. Two small infestations have been found in Calais, where scouting work is still in progress.

Scouting in Vermont concentrated in Green Mountain section.—Many of the gypsy moth crews employed in northern Vermont were engaged, during the first part of November, in scouting the summits of the mountains along the Green Mountain Range, where spruce and northern hardwoods predominate.

Small gypsy moth infestations found in Vermont portion of barrier zone.—Two gypsy moth infestations totaling four egg clusters were discovered in the town of Goshen, and three single-egg-cluster infestations were found in Granville, up to the middle of November. Both of these towns are located in central Vermont, within and adjacent to the eastern border of the barrier zone. These are the first infestations to be found in the Vermont portion of the barrier zone since the Essex colony was eradicated during the fiscal year 1936. Evidently the presence of egg clusters in both towns was due to the windspread of small caterpillars from severe infestations existing in the White River Valley, to the east of the barrier zone.

Gypsy moth scouts protected during deer-hunting season.—With one exception, all Federal W. P. A. gypsy moth employees scouting in territory in Vermont where hunting is prevalent were removed from the woods during the open season on deer, from November 21 to 30, as a safety measure. They confined their work during this period to scouting in large strips of open country and in residential areas. The workers employed in the vicinity of Bolton, in northern Vermont, were assigned to duty during the latter part of November in a 3,000-acre tract of woodland which had not only been posted against hunting, but which was patrolled to prevent unlawful hunting in the area.

Instructive meeting held in Wilkes-Barre.—A meeting of the Pennsylvania Department of Forests and Waters and the Pennsylvania Department of Agriculture was held in Wilkes-Barre on the evening of October 25. A large

number of members of the two departments was present, and had as guests representatives of the New York Conservation Department, the New Jersey Department of Agriculture, the Wild Life Association, and the Federal Bureau of Entomology and Plant Quarantine. Motion pictures of the damage done to forests when the gypsy moth becomes sufficiently abundant to defoliate tree growth were shown, and several speakers described the life history of the insect and the various types of work employed to control it. On the following day a trip was taken through a part of the gypsy moth infested territory, so that those present would have an opportunity to examine the work that had been done by the Federal Bureau in cooperation with the State of Pennsylvania, and to observe some of the field workers actually engaged in scouting and treatment work.

No infestation found outside of Pennsylvania quarantined area.--It was recently reported to the Federal gypsy moth office that gypsy moth egg clusters had been found outside of the Pennsylvania quarantined area on a farm in Maton Township, Wyoming County. An investigation by Federal employees failed to disclose any evidence of the insect on the property. The person who made the report visited the property with the supervisor of the district, but was unable to locate any egg clusters, and the report is evidently baseless.

C. C. C. gypsy moth crews concentrate on ground work.--During the first half of November C. C. C. gypsy moth crews in Connecticut were chiefly engaged in doing ground and low work in the heavily infested Granby-Simsbury area. The men from the Westfield, Mass., camp were employed in piling and burning brush and forest debris that resulted from thinning work done earlier this year. C. C. C. crews in Vermont that normally would be used in gypsy moth scouting were still engaged in emergency work made necessary by the recent hurricane, and no gypsy moth work was done in that State during the first half of November.

Gypsy moth work reduced as C. C. C. repairs hurricane damage.--The C. C. C. is playing an important part in rehabilitating the forests damaged by the September hurricane. This emergency work is necessary in order to remove serious fire hazards and to open wood roads so that fire-fighting apparatus can reach isolated localities. Such work is being done at the expense of the regular work that had been planned. C. C. C. gypsy moth work has suffered greatly because of the emergency work, and less than half of the planned gypsy moth work was being performed as late as the middle of November.

Ground work in progress at heavy Connecticut infestation.--During the 3-month period from July 1 to October 1 new gypsy moth egg clusters treated by C. C. C. enrollees at the Granby-Simsbury infestation in Connecticut numbered 556,289. These clusters were deposited on ledges, rocks, stumps, and on the trees to a height of about 6 feet. Many more egg clusters that have not been treated are present on ground debris, logs, and cavitied trees which have been cut and gathered into piles for burning after snow covers the ground, and a large number of egg clusters remain higher up on the trees. Many of the trees containing heavy deposits of egg clusters will be climbed so that the higher egg clusters can be treated after snow puts a stop to the ground work. This method of concentrating on low work before snow falls, and later burning debris and creosoting egg clusters located higher up on

the trees should result in the destruction of the greatest possible number of eggs before hatching time, thereby reducing the danger of windspread of small caterpillars from this exceptionally heavy infestation next spring. Approximately 90 C. C. C. enrollees were employed in the 76-acre area where work was in progress about the middle of November, but until that date considerably fewer men were available.

PLANT DISEASE CONTROL

Eradication crews encounter many species of barberry in Ohio.--In November more than 16,000 barberry bushes and seedlings were destroyed on 74 properties in Highland, Lake, Miami, Montgomery, Preble, Ross, Shelby, and Warren Counties in Ohio. Many of these were found in or near nurseries in Lake County where many different species of barberry bushes were grown some years ago. Among the infested properties cleared were 12 having Berberis neuberti and one having B. sieboldi. During the past year the following rust-susceptible species of barberry have been located in Ohio: B. vulgaris, B. neuberti, B. ottawensis, B. vernae, B. wilsonae, B. sieboldi, B. diaphana, B. amurensis, B. aggregata, B. macrocarpa, and B. vulgaris atropurpurea. Among the immune species encountered in the course of field operations were B. thunbergi, B. mentorensis, B. circumserrata, B. julianae, and B. verruculosa.

Intensive barberry survey completed in 42 counties in Indiana.--In analyzing the results of control work completed in Indiana in connection with the barberry-eradication program since emergency funds became available in 1933, Stanley, Castell, State leader, finds that all uncultivated land in an area equivalent to 42 of the 92 counties in the State has been carefully inspected. In 11 counties that are representative of these 42 he finds that 64 percent of the area can now be considered relatively free of barberry bushes. The percentage of barberry-free territory in individual counties, however, ranges from 20 to 100. There are on record in Indiana 166 areas where barberry bushes have been found growing wild.

Identification of unusual physiologic races of rust leads to discovery of barberry bushes.--Recently physiologic races of Puccinia graminis tritici 65 and 147 were identified from rusted barley collected in Providence Township, Lac qui Parle County, Minn. Inasmuch as these races are unusual, L. W. Melander, leader in charge of barberry eradication in Minnesota, made an intensive search of this particular area with the result that a barberry bush about 7 feet in height and having a crown of about 2½ feet was found. He reports that there were still old aecial scars on many of the leaves. In addition to indicating the role isolated bushes may play in the production and establishment of new parasitic races, experiences of this kind point to the possibility that our annual physiologic race survey may have a practicable and valuable application in connection with our clean-up work in areas where barberry bushes are few and widely scattered.

Autogiro mapping of forest areas damaged by hurricane.--An experiment was conducted during the period October 27-29 to determine the practicability of using an autogiro in mapping areas of "blow-down" timber in the vicinity of Keene, N. H. It was possible to examine a total of 74,140 acres in 6½ hours of actual mapping time, and to record a total of 18,184 acres of blow-down timber. In order to compare aerial and ground mapping, the observer

made a ground check of a representative block comprising 224 acres and containing 140 acres of felled timber. This ground work required 6 hours and the observer examined an average of 37 acres per hour. On the other hand, in the same length of time on the aerial survey he examined an average of 11,406 acres per hour. In other words, the aerial survey was 308 times faster than the ground work. The location, size, and shape of a few of the areas mapped from the air were checked by the ground survey. The results showed that the areas had been accurately located on the map and their size as determined from the autogiro was about 70 percent correct.

Accomplishments in blister rust control work in 1938.--The following table shows by regions the approximate results of blister rust control work during the calendar year 1938, up to and including October. The figures for "area worked" include the areas initially cleared of Ribes, as well as those that were reworked.

Region	: Area	: Ribes	: Labor	: Ribes per
	: worked	: pulled	: Man-days	: acre
	: Acres	: Number		: Number
Northeastern-----	700,414	13,525,356	194,961	19.3
Southern Appalachian--	646,901	4,228,479	35,051	6.5
North Central-----	405,452	17,357,025	77,476	42.8
Northwestern-----	172,883	38,454,278	194,013	222.0
Sugar pine-----	137,228	23,008,940	159,205	167.7
Total-----	2,062,878	96,574,078	660,706	--
Average-----	--	--	--	46.8

Hurricane damage to white pine in New England.--E. C. Filler reports that, according to the best estimates available, a total of 2,263,244,000 board feet of white pine was blown down by the hurricane of September 21, 1938. The following table indicates the estimated amount of white pine timber blown down in each State and shows the counties in which most of the damage occurred.

State	: Board feet of:	County in which	: Extent of damage
	: white pine :	most damage	: (percentage of
	: blown down :	occurred	: total)
	: Thousands :		
Connecticut----	175,000	Windham, Tolland	84
Maine-----	120,000	Oxford, Cumberland, York	98
Massachusetts--	628,225	Middlesex, Franklin,	70
		Worcester	
New Hampshire--	1,222,509	Cheshire, Hillsboro, Merri-	--
		mack, Sullivan	
Rhode Island---	51,000	Kent (towns of Coventry and:	--
		West Greenwich), Exeter	
		(town of Washington)	
Vermont-----	66,510	Orange, Windsor	70
Total-----	2,263,244	--	--

Girl scouts aid in protecting white pines from blister rust.--In the summer of 1937 the Girl Scouts at the May Flather Girl Scout Camp located at Mt. Solon, Va., in the George Washington National Forest, began a conservation project and, through the assistance of G. C. Cramer, district blister rust leader, they learned to identify Ribes bushes and white pine, then were given actual training in eradicating these bushes to protect the pine. They took a keen interest in this work, and in the summer of 1938 they began Ribes eradication in earnest. During the season a total of 554 Ribes were pulled in 237 hours of work and 20 acres of ground covered in white pine areas. When one considers that these girls came from the city and were in many instances only 12 or 13 years old, and that the work was not always easy for them, their accomplishments take on added significance.

COTTON INSECT INVESTIGATIONS

Insecticide tests against pink bollworm.--In summarizing insecticide tests against the pink bollworm made at Presidio, Tex., during July and August, W. T. Hunt and O. T. Robertson report the percentage reduction in population with 10 of the insecticides used as follows:

Insecticide	Reduction in population Percent
Syncrolite 90%-celite 10%-----	75.7
Barium fluosilicate 90%-celite 10%-----	72.1
Alorco dusting cryolite-----	69.8
Alorco cryolite-----	65.2
Fixed nicotine-----	63.6
Dual fixed nicotine-----	59.4
Phenothiazine 20%-dolomite 60%-celite 20%-----	51.2
Paris green 10%-lime 40%-Kaolin 50%-----	36.5
Calcium arsenate 50%-sulphur 50%-----	30.4
Calcium arsenate-----	21.5

These insecticides were applied with hand dust guns, the applications being made, so far as possible, at 4-day intervals between 6 and 8 a.m., with two trips per row. In 1 experiment in which the first 4 materials on the list were used, the cotton was dusted 10 times. In the tests in which the other six materials were used, the plants were dusted six times. Syncrolite was the only material that was used in all three tests and in each instance it caused a greater reduction in the pink bollworm population than any of the other materials.

Cotton flea hopper control experiments.--There was a heavy infestation of the cotton flea hopper in southern Texas this year and conditions were favorable for insecticidal tests at the Port Lavaca, Tex., laboratory. K. P. Ewing and associates used 1/8 1-acre plots and 97 1/20-acre plots in their tests comparing sulphur, sulphur-arsenical mixtures, and other insecticides against the flea hopper. The infestations were determined by counting the flea hopper nymphs and adults in the terminal buds of the plants. In the 1-acre plots an average of 1,900 plants per plot were examined during

the season May 30 to July 8. The maximum infestations in the check plots of the different experiments ranged from 61 to 201 flea hoppers per 100 terminal buds and occurred around June 15. The average seasonal infestation in the checks was 75.5 hoppers per 100 buds. The average gains from dusting were higher this year than ever before, the 36 dusted plots averaging 311 pounds of seed cotton, or 53 percent, gain, and \$9.74 net profit per acre over the 12 checks. In one series (three replications) the average gain from sulphur was 243 pounds and \$7.62 net profit; from a mixture of 20 percent calcium arsenate and sulphur, 256 pounds and \$7.54; and from 33-1/3 percent calcium arsenate and sulphur, 305 pounds and \$9.48 net profit per acre. Another series (three replications) gave an average gain of 294 pounds and \$9.24 profit per acre from 20 percent calcium arsenate-sulphur, and 388 pounds and \$12.71 profit from 33-1/3 percent calcium arsenate-sulphur. In a series (three replications) comparing different percentages of calcium arsenate and sulphur, the gains from the 20 percent calcium arsenate-sulphur were 294 pounds and \$9.34 profit; from the 33-1/3 percent calcium arsenate-sulphur, 388 pounds and \$12.79 profit; from the 50 percent calcium arsenate-sulphur, 405 pounds and \$13.28 profit. The maximum gain from any of the treatments was 680 pounds (130.8 percent) and \$25.11 profit per acre from a 50 percent calcium arsenate-sulphur mixture. The season's results showed definitely that mixtures of calcium arsenate and sulphur containing 33-1/3 or 50 percent calcium arsenate gave better and more economical control of the flea hopper than sulphur alone or a mixture containing only 20 percent calcium arsenate. Mixtures of paris green and sulphur containing 7½ percent and 10 percent paris green, respectively, also gave much better and more economical control of the flea hopper than sulphur alone. There was practically no difference, as shown from the infestation records, bloom counts, and yield records between these two mixtures of paris green and sulphur; nor was there any practical difference between the paris green-sulphur mixtures and the calcium arsenate-sulphur mixtures containing 33-1/3 percent and 50 percent calcium arsenate. In three experiments the average gain from sulphur alone was 334 pounds and \$11.43; from 7½ percent paris green-sulphur, 450 pounds and \$15.23; and from 10 percent paris green-sulphur, 463 pounds and \$15.44. During the season the experiments received from three to five dust applications but some were washed off by rain, leaving from two to three effective applications with an average of 2.8. The average poundages of the different insecticides applied per acre at each application ranged from 13.35 to 14.79. The results in the 1/20-acre plots in latin squares were in line with those in the 1-acre plots, showing that the sulphur-arsenical mixtures gave better control than sulphur alone. In these tests a micronized sulphur, claimed to be 5,000 mesh and at least 95 percent pure, dusted at 7.5 pounds per acre gave practically the same gains as the ordinary 325-mesh dusting sulphur applied at 15 pounds per-acre application. A mixture of 20 percent cryolite and sulphur gave considerable control but apparently did not contain sufficient cryolite to equal the arsenical-sulphur mixtures. Barium fluosilicate, dusted at the rate of 7.5 pounds per acre, caused only a slight reduction in the flea hopper infestation and light burning of the plants, which reduced the yield in the dusted plots below that in the untreated plots.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Gin-trash inspection.--Gin-trash inspection in all areas was discontinued at the close of November. During the month inspections were made mainly within the regulated area of the Texas Panhandle and bordering counties and in the Salt River Valley and Casa Grande-Coolidge area of Arizona. In the Panhandle additional specimens were found in counties already under regulation, but no new areas were involved. With the completion of inspection in the Salt River Valley a total of 116 specimens had been taken from gin-trash inspection. All pink bollworm findings during the month came from trash collected at the Gilbert Gin Co., Gilbert, Ariz. Separate samples of trash from individual farms were collected and examined. Results indicated that the infestation was concentrated in a small area east of Gilbert, with practically all the worms coming from one field--the Northrup farm. Field inspections will be made on adjoining and nearby premises to determine as nearly as possible the extent of the infestation. In Pinal County, Ariz., four specimens were taken from trash collected at gins located in the vicinity of Coolidge. Toward the end of November inspections were made at Yuma and Parker, with negative results. One crew operated at Mexicali, Lower California, practically all of the month. Conditions were extremely favorable during the period of inspection. Large amounts of trash were examined from over a wide area. There were no indications of pink bollworm infestation. Before inspection was terminated in Arizona a recheck was made in the Santa Cruz Valley and in the Safford Valley. A few additional worms were found at Safford, but the crew operating at Tucson was unable to make any further findings in the Santa Cruz Valley. During October 9, specimens were taken from gins in Pima and Santa Cruz Counties. The season's inspection in the Santa Cruz Valley indicated a rather sharp increase in Thurberia weevil infestation in the cultivated cotton. Weevils were found from cotton produced in fields from Calabasas to Marana, a distance of approximately 82 miles of Santa Cruz Valley land, containing 10,340 acres planted to short- and long-staple cotton.

Stalk destruction.--Personnel in the lower Rio Grande Valley continued to spend practically all their time during November in carrying out the stalk-destruction program. Three inspectors with cars spent their full time in Mexico. During the month 1,193 acres of stalks were plowed, leaving 602 acres to be taken care of. Of this amount, only 93 acres were still standing at the end of the month. Additional fields of soca cotton were located during the month, bringing the total acreage located to date to 2,855. Of this amount 2,184 acres have been plowed, 562 acres of which were plowed during the present month. Stalk destruction was the chief activity in the Coastal Bend area during November. Weather conditions hindered the work to some extent. It is estimated that of the 2,908 acres of cotton land not yet plowed there remains approximately 29 acres of original stalks that have not been cut, those acreages being located in Jim Wells County. These small acreages are of no menace at the present time, owing to cold weather during the latter part of the month. A light frost early in the month and a light freeze toward the end of November did considerable damage to cotton growth in the greater part of the Coastal Bend district. Seedling cotton was severely damaged. Stubble cotton, even though foliage was killed, has still sufficient life left that it will no doubt start growing when conditions become favorable.

Texas Panhandle district.--Weather conditions continued most favorable during November for the continued harvesting of the cotton crop. This fall has perhaps been the most favorable with reference to weather conditions in the history of cotton production in the area. Cotton pickers migrated to the area early in the season and remained in sufficient numbers to cause the crop to be gathered very rapidly. With such favorable picking and ginning conditions, it was possible to give the area a very thorough gin-trash inspection. Findings made in the regulated counties were as follows: Midland County, 16 specimens; Howard, 2; Andrews, 6; Dawson, 4; Gaines, 1; Terry, 1; Cochran, 2; and Lamb, 1. These findings indicated a general but light infestation over the entire district. During the month three road patrols operated to check trucks moving cottonseed to designated mills and to prevent the illegal movement of said cotton and cottonseed out of the area. A road patrol was established at a point leading out of the district on State Highway No. 9 to check cotton pickers departing from the area. During the period November 12-30 a total of 1,008 pickers was inspected and 3,967.5 pounds of seed cotton and 43 pounds of cottonseed were intercepted and burned.

Big Bend area.--Clean-up was completed on November 12, with approximately 3,000 acres of cultivated cotton and about 800 acres of soca being cleaned. A very good clean-up of cotton fields on the Mexican side of the river was accomplished. The Mexican inspector did an excellent job, and practically all fields were completed during the month. The month of November was unusually cold. The temperature dropped to 18° above zero at Presidio for several days early in the month, which no doubt killed a considerable number of pink bollworms. An inspection of nine fields in the Pilares section showed that 80 percent of the worms had been killed by the cold weather. An inspection trip was made to Casa Piedra during the month and it was found that out of 11 worms 8 had been killed apparently by the cold weather.

Wild-cotton eradication.--During the first part of the month the number of W. P. A. workers was increased from 75 to 90. In addition to the areas covered last month, work was also begun in the Biscayne Bay Keys, Lower Matecumbe, and Ten Thousand Islands section. During the month approximately 68,000 wild cotton plants were destroyed, of which 101 had matured fruit. One new colony was located in Hillsborough County. From this colony, 15 plants were removed, of which 2 had matured fruit. A total of 199 domestic plants were removed from railroad rights-of-way in Hillsborough County.

Thurberia-plant eradication.--During the month of November 19,470 Thurberia plants were located and destroyed over 1,920 acres of extremely rough territory. It was necessary to build 9 miles of trail over the mountain to get in camp equipment and supplies, as well as repair 3 miles of trail to make it safe for trucks to pass over. For the next 3 months in order to get camps in strategic locations it means constantly moving camps for short periods. This is the only way the plant colonies can be reached without the men spending too much time in walking to and from work. Practically all Thurberia plants destroyed throughout the month have been infested with weevils in all stages.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Tartar emetic gives best results in the control of gladiolus thrips.--Field tests with various sprays against Taeniothrips simplex Morison, which were performed during 1938 by F. F. Smith and G. V. Johnson, of the Beltsville, Md., laboratory, have led to the following tentative conclusions: (1) Tartar emetic-brown sugar sprays were practically equal in efficiency, whether 2, 3, or 4 pounds of tartar emetic were used with 8 or 16 pounds of brown sugar per 100 gallons of spray. On plots sprayed with 2 pounds of tartar emetic there appeared to be less residual effect of the tartar emetic than where 4 pounds were used, hence the thrips caused more injury later in the flowering season on plots where the lower dilutions were used. No injury to gladiolus foliage resulted from the tartar emetic sprays and the control achieved was equal to that obtained with sprays containing paris green and brown sugar. (2) Sprays containing 2 pounds of paris green and 64 pounds of brown sugar per 100 gallons of water gave a satisfactory degree of control but caused moderate-to-severe foliage injury, the magnitude of which varied with the variety of gladiolus. (3) Sprays containing derris and peanut oil transformed the normal green surface of the gladiolus foliage to an oily dust-covered condition, accompanied by a yellowing of the foliage. The plants sprayed with this combination were also retarded for more than a week in the development of their flower spikes. The plants which were treated with a derris root powder spray containing 0.02 percent of rotenone were more adversely affected than those treated with a derris root spray containing 0.015 percent of rotenone, even though peanut oil was used at a concentration of 1 percent in both of these sprays. In addition to stunting the growth and delaying the flowering of the gladiolus, the sprays containing derris root and peanut oil gave practically no control of the gladiolus thrips. (4) A spray composed of derris root powder containing 0.015 percent of rotenone, with varnish as a sticker, gave partial control of the thrips. (5) A spray containing tartar emetic alone (4-100) gave no control of the thrips, demonstrating the necessity of using brown sugar with this material to obtain satisfactory results. (6) A spray containing nicotine sulphate (1-500) with karaya gum (1-500) was also ineffective as was tartar emetic (4-100) with a commercially prepared sodium oleyl sulphate as a wetting agent.

Control of rose midge on outdoor-grown roses.--C. A. Weigel and G. V. Johnson, Beltsville, report that an infestation on outdoor-grown roses in the District of Columbia, apparently the rose midge Dasyneura rhodophaga Coq., has been brought under control by the application of tobacco stems as a mulch, supplemented by cutting all infested tips and frequent spraying with nicotine sulphate and fish-oil soap solutions. When this infestation was reported early in the month of August, the rose midge larvae were causing 100 percent loss of all new flower buds and tender tips. The treatment described above reduced the infestation to such an extent that flowers were again being produced early in September. Similarly a rose midge infestation on Long Island was being controlled by keeping the surface of the infested rose bed mulched with ground tobacco stems.

Narcissus bulb fly control experiments.--Ralph Schopp and P. M. Eide, of the Sumner, Wash., laboratory, report that as a result of experiments with insecticides directed against Merodon equestris (F.) during the season of 1938, promising results have been obtained with sprays containing either

a mineral oil emulsion or arsenate of lead to which had been added a special mineral oil mixture as a sticker. The former spray reduced the number of bulbs infested by the bulb fly approximately 81 percent, and the latter spray resulted in a reduction of infested bulbs of approximately 76 percent, as compared to untreated plants grown under comparable conditions. Percentages of control exceeding 50 percent were also obtained with a dust mixture composed of dichloroethyl ether absorbed in hydrated lime and a cube root dust mixture containing 0.5 percent of rotenone. These sprays and dust mixtures were applied at the base of the narcissus plant where the bulb flies ordinarily oviposit. The first applications of the insecticides were made on May 6, coinciding with the time of emergence of the first M. equestris adults, and since heavy showers occurred soon after the first applications, they were repeated on May 23. Several compounds containing nicotine were included in the experiments and three fluorine compounds were also included. None of these gave satisfactory results.

Growers use insecticides for raspberry fruitworm control.--B. J. Landis and W. W. Baker, of the Puyallup, Wash., laboratory, report that a field survey at the close of the 1938 season disclosed that, of 50 Puyallup Valley raspberry growers who were contacted, 46 used insecticides containing rotenone in combating Byturus unicolor Say last season. Of the growers who used dust mixtures containing rotenone, 63.6 percent made one application, 27.3 made two applications, and 9.1 percent made three applications. Of the growers who used sprays containing rotenone, slightly more than half made one application and none made more than two applications. Judging from all available information, it appeared that with two applications of the sprays or two to three applications of the dust mixtures, timed and applied properly, satisfactory control of the raspberry fruitworm was obtained. These results coincide in general with the results obtained in experimental plots which have indicated that sprays containing 0.01 percent of rotenone were slightly better than dust mixtures containing 0.5 percent of rotenone, and that three applications of these insecticides were superior to two applications.

Control of red spiders on cucumber.--C. A. Weigel and G. V. Johnson, Beltsville, report that the results of mortality counts of Tetranychus telarius L. on greenhouse-grown cucumber plants after applying six sprays, the first two of which were applied 4 days apart and the remainder at weekly intervals, indicated that in sprays containing 0.0056 percent of rotenone and 0.01 percent of total pyrethrins, with sulphonated castor oil (1-300), a greater kill resulted than when an alkylphenylbenzenesulfonic acid was used as a spreader. This agrees with the results of previous experiments and indicates the superiority of sulphonated castor oil when used as a spreader. The addition of pyrethrum to derris and sulphonated castor oil spray did not increase its effect against red spiders. Sulphonated castor oil diluted 1-300 when used alone did not possess much toxicity to the spider mites. A proprietary thiocyanate gave a good kill of red spiders. Tartar emetic and brown sugar applied three times gave a kill of 100 percent of the spiders but caused serious injury to the cucumbers and reduced the yield of fruit. Peanut oil used with derris and pyrethrum at the strength indicated above killed 98.5 percent of the spiders after four applications but caused a yellowing of the cucumber foliage. There was no positive correlation found between the yield of cucumbers and the control of red spiders obtained with the various sprays.

Fumigation experiments with methyl bromide against the cigarette beetle.--W. D. Reed and J. P. Vinzant, of the Richmond, Va., laboratory, report that dosages of 5 and 6 pounds of methyl bromide per 1,000 cubic feet were effective in killing full-grown larvae of Lasioderma serricorne (F.) in experiments in the fumigation of baled Turkish tobacco at reduced pressures under summer conditions of high temperature, at an exposure of 4 hours. The mortality of the test larvae was 100 percent for all lots which were given a 4-hour period of post-fumigation and virtually 100 percent for all lots of test insects which were removed from the tobacco bales at the expiration of the 4-hour exposure period. When the fumigated tobacco received three air washes before being removed from the fumigation tank, the mortality of test larvae placed in the bales of tobacco after its removal to storage quarters was much reduced, as compared with that attained in the tobacco receiving one air wash. These results indicate that a sufficient concentration of methyl bromide is retained for some time in the fumigated tobacco to effect a high mortality of cigarette beetle larvae. Chemical tests with a leak detector indicated that a concentration of 500 parts per million of methyl bromide was present near the stacked bales of fumigated tobacco in the fumigation tanks during the process of unloading. In one experiment a concentration of 1,460 parts per million was built up from the treated tobacco stored in a gas-tight room for 17 hours. Additional chemical tests were performed which showed that appreciable concentration of methyl bromide is retained in tobacco by absorption and that satisfactory aeration would have to be devised for the use of this gas in tobacco factories and warehouses.

FOREIGN PLANT QUARANTINES

Fruitfly in allspice.--Living larvae and pupae of the Mediterranean fruitfly (Ceratitis capitata Wied.) were intercepted at New York on October 20, 1938, in and among allspice (Pimenta officinalis) berries in baggage from Bermuda. The berries were so heavily infested that the contents of the container were a miscellaneous jumble of larvae, which had crawled out of the host, and pupae, which had formed outside of it. This represents a new host record for the files in this office. The interception was made by Inspector O. G. Fitzgerald.

Life along the Border.--Notebooks of Mexican border inspectors tell of a home-cooked basket dinner carried by a motherly lady who had "no fruit or plants." A big roast chicken fitting closely in the top of a deep casserole and looking especially appetizing was found to conceal ten large whole avocados. A woman pedestrian kept up a monotonous refrain of, "I don't have any fruit," as the inspector examined her numerous packages, until he found three whole avocados in the dressed goat in the largest parcel. Four elderly ladies unable to eat all of their pears gave the remaining two to the inspector saying they were too good to throw away. One pear contained three fruitfly larvae (Anastrepha sp.). Examination of a small parcel en route from Mexico to Tanganyika, Africa, disclosed that it contained 11 Inga pods in which were 36 larvae of Anastrepha distincta Greene, as well as a few other insects. A bulging hip pocket yielded two guavas from a Mexican who had "no fruit" and his loud voluntary protestations that a woman passenger on the same bus had no fruit led to a careful search until a guava was found in her purse, which might not have been opened otherwise. It was disclosed that the couple were man and wife, therefore the husband had two fines

to pay, while the inspector mentally recalled the Mexican proverb, "The closed mouth catches no flies." A corpulent lady in an air-conditioned car perspired so freely when questioned regarding plant material that the inspector's suspicions were aroused, but he was unable to find any contraband in her hand baggage. Later she became greatly agitated again when her trunk was to be inspected, although still maintaining she had no contraband. Under a false bottom in the trunk were five tropical plants. One lady tourist had to be asked to get out of a car being inspected. A large quince rolled off the seat when she got up. Although all passengers declared they had "no fruit," four guavas were found hidden in a bag of clothing. One guava contained eight larvae of Anastrepha sp. and the quince contained 3 such larvae.

Entomological interceptions of interest.--Seven living larvae of the trypetid Anastrepha nonbimpraeoptans Soin were intercepted at the airport in Puerto Rico on May 21, 1938, in a mango in express from the Dominican Republic. Twenty larvae, living and dead, of the Mediterranean fruitfly (Ceratitis capitata Wied.) were intercepted at New York on August 26, 1938, in seven dates (Phoenix dactylifera) in baggage from Bermuda. A living adult of the cucujid Laemophloeus iteratus Sharp was taken at New Orleans on June 17, 1938, under the bark of a mahogany log in cargo from Panama. Living specimens of the whitefly Neomaskellia bergi (Sign.) were collected on January 14, 1938, on sugarcane leaves in the field at Mata, Guam. Two dead larvae of the Asiatic rice borer (Chilo simplex Butler) arrived at Chicago, Ill., on July 5, 1938, in rice-straw packing in the mail from India. A living adult of the weevil Leiosoma oblongulum Boh. was found at Washington, D. C., on June 6, 1938, in soil around primrose plants in the mail from England. Living specimens of the scale insect Chrysomphalus nigropunctatus O'kell were intercepted at San Francisco on June 27, 1938, on a plant of Echeveria marginata in the mail from Mexico. Two living adults of the bruchid Acanthoscelides flexicaulis (Schaeffer.) were taken at Hidalgo, Tex., on September 5, 1938, in ebony beans (Caesalpinia sp.) in baggage from Mexico. Two living specimens of the olethreutid Ofatulena duodecemstriata (Wlsm.) arrived at Brownsville, Tex., on July 7, 1938, in mesquite beans in baggage from Mexico. A living adult of the weevil Calendra pertinax Oliv. was found at El Paso, Tex., on July 31, 1938, in a pear fruit in baggage from Mexico. The pink bollworm (Pectinophora gossypiella Saund.) was intercepted at Miami, Fla., on April 29, 1938, in cottonseed in baggage from the Bahamas. The two pounds of cottonseed were used as stuffing in a pillow.

Pathological interceptions of interest.--Aphelenchoides demani Goodey, Ditylenchus dipsaci (Kuhn) Filipjev, and Pratylenchus pratensis (de Man) Filipjev were intercepted at New York on November 21 on lily-of-the-valley pips from Holland. A. hodsoni Goodey was intercepted in a narcissus bulb in baggage from Europe (country of origin not known) on October 23 at New York. Cryptostictis sp. (no species reported on host) was found on Brabejum stellatifolium in special permit material from New Zealand at San Francisco on September 8. Diplodia henriquesiana Trav. and Spessa. was intercepted on orchids from Venezuela August 24 at Washington. Discosia pini Heald was intercepted on Pinus strobus cones from Germany at New York on November 15. Ditylenchus dipsaci (Kuhn) Filipjev and Sclerotium semen Tode were found in Iris angelica from Holland on October 5 at Washington, D. C., Gymnosporangium haraeaeum Syd. was found on juniper foliage from Japan in ship's quarters on

February 21, 1938, at Seattle. This species is listed in Stevenson's manual as G. koreaense. Leptothyrium pomi (Mont. & Fr.) Sacc. was intercepted on jobo from Barbados on November 7 at Boston. Pestalozzia neglecta Thum. was intercepted on November 8 at Seattle on Euonymus radicans from Japan. Pestalozzia sp. (no species reported on the host) was intercepted on Brabejum stellatifolium from New Zealand on September 8 at San Francisco. Phoma iridina Maire and Sacc. was intercepted on iris roots from France on August 23 at Washington. Physopella fici (Cast.) Arth. was intercepted on fig leaves in baggage from Cuba on October 3 at Miami. Puccinia coronata Cda. was intercepted on Arrhenantherum elatius var. bulbosum leaves in cargo from Germany on October 25 at New York. Septoria azaleae Vogl. seems to have been more abundant than usual this year, having been intercepted at Washington in October and early in November on azaleas under five permits from Holland and under two from Belgium.

DOMESTIC PLANT QUARANTINES

Grasshopper survey completed.--Grasshopper infestations in 1939 will be less severe than those of 1938, according to indications of the recent survey of grasshopper eggs throughout the region from the Mississippi Valley to the Pacific coast. In most of that region the control operations of the past season reduced the potential danger of grasshopper outbreaks in 1939, the reductions shown by egg counts ranging from one-third to two-thirds in Wisconsin, Iowa, Missouri, Kansas, and Oklahoma. The survey made in the fall of last year indicated a need of 178,000 tons of mixed bait. The accuracy of the 1937 survey was evidenced in the 1938 season in different States where normal hatching occurred and it is now generally conceded that the potential infestation as indicated by the survey was remarkably accurate.

Results of grasshopper poisoning in 1938.--Grasshoppers were profitably and satisfactorily controlled in the 24 Western States in which baiting operations were carried on the past field season through Federal-State activities. In the region from the Mississippi Valley to the Pacific coast, it is estimated that, for each dollar invested in the purchase and mixing of bait materials, approximately \$79 was saved through the application of poison bait. More than 400,000 farmers used approximately 155,000 tons of mixed bait on about 30,000,000 acres of land and this afforded protection for more than 55,000,000 acres of crops. The estimated savings for 1937 were \$102,283,000, or \$51 for each dollar spent for bait. The estimated losses for 1937 were \$65,800,000.

Migratory hoppers present special problem.--More effective results were obtained this year in control operations in regions where the different kinds of hoppers which destroy crops did not show marked tendencies to migrate long distances by flight. Also, in areas where the migratory species developed, there was a high degree of control which prevented much flight and resulted in substantial savings of crops. Where the available man power was sufficient to bait the hatching places before the young hoppers migrated into crops, and where there was a good organization to fully utilize community efforts, the losses were reduced to a minimum. In all States, however, there were some losses because many farmers simply will not use bait until they have visible evidence of damage to their crops. The larger portion of the estimated loss of \$27,000,000 occurred principally

in the northern Great Plains area, where eggs of the migratory Melanoplus mexicanus Sauss. hatched in numbers ranging from 1,000 to 10,000 per square yard on idle and abandoned agricultural land. Hatching was prolonged by periods of cool weather, necessitating repeated applications of bait. In parts of this area farm population does not exceed two or three families per township and it is impossible for the available man power to bait the extensive hatching places. The situation resulted last July in the largest flight in recent history into 15 counties in eastern Montana, 3 in Wyoming, some scattered counties in North Dakota and South Dakota, and in areas along the Red River Valley in North Dakota and Minnesota. These flights discouraged farmers from further baiting in areas where good control had already been effected but which was nullified by incoming hordes from other sections.

Conference on grasshopper control.--A conference of Federal and State plant-pest-control officials was held at Omaha on November 21 and 22, attended by representatives of the Bureau and of 17 Western States. The results of the grasshopper-control operations of the 1938 season were presented, fall survey of grasshopper eggs reported on, and the potential needs of 1939 discussed.

Extent of Mormon cricket control in 1938.--The crop acreages protected from Mormon cricket damage in the 10 States in which cooperative Federal-State control operations were carried on total 1,375,000 acres. Such control is evidenced by the fact that, although 14½ million acres were known to be infested in Colorado, Idaho, Montana, Nebraska, Nevada, North Dakota, Oregon, South Dakota, Utah, Washington, and Wyoming, less than 13,000 acres of crops were destroyed. These losses occurred almost entirely in isolated areas where cooperative control could not be well organized. In one of the older infested areas the control operations resulted in apparent eradication of the crickets, and in several other areas cricket populations were so reduced as to indicate possibilities of eradication. Chief dependence in control measures was placed on the application of sodium arsenite dust mixed with diatomaceous earth or hydrated lime, at the rate of 5 pounds of the mixed dust per acre, applied with either hand or power dusters. The dusting operations were supplemented by the use of metal barriers and pen traps, by oil-on-water barriers, and by trench barriers. Approximately one-third of the cost was provided by the States, counties, communities, and individuals, and two-thirds by this Bureau.

Mormon cricket survey.--Surveys conducted in the current fall by Federal supervisors in all areas known to be infested with Mormon crickets indicate that infestations exist on nearly 19 million acres of land in the 10 States (except Colorado) in which control operations were conducted last season, and also in Nebraska. The estimate for 1937 was 14,165,000 acres. The seeming increase is due mainly to the fact that records are not available for 1937 infestations in Nebraska and the Dakotas and that the 1938 survey is more complete.

White-fringed beetle control.--Activities in November consisted principally of regulatory work with a force of 23 Federal inspectors, 15 of whom devoted full time to this phase of the work, and 11 State inspectors, of whom 7 gave full time. The commodities checked for quarantine compliance consisted principally of forest-plant products, farm-tenant equipment, and farm produce, including peanuts, of which a record crop of 3½ million pounds

was marketed at Florala, Ala. Few violations of the quarantines were observed throughout the regulated areas. Some roadside interceptions were made, however, of such materials as hay and building materials. In the New Orleans area 14 Federal and State inspectors are conducting regulatory work in order to give prompt attention to the movement of nursery stock and other restricted articles from nurseries and stores. Soil sterilization is supervised and only plants that are potted in sterilized soil may be moved to points outside the regulated areas. Nurserymen are cooperating well in this work. The commodities for which permits have been issued since July 1, are, in order of importance: Forest products, nursery stock, and cotton products. On the control phase of the project, the November work consisted principally of the removal of brush to clear the way for subsequent control operations and the cutting and burning of vegetation, with the labor assistance of State-sponsored W. P. A. crews. Adult beetles had practically disappeared the first week in November and no beetles were collected in the traps at Laurel, Miss., after November 22.

Calcium arsenate effective in checking white-fringed beetle infestations.---To further check the results of applications of calcium arsenate, a count was recently made at a known infested nursery of larvae in the soil dug to a depth of 8 inches and sifted. Two larvae to the square yard were found in soil that had been so treated, as compared with 49 in untreated soil. The two properties had been about equally infested with adult beetles. At another point the counts ran from 0 to 12 per square yard on dusted properties and from 49 to 90 on those not dusted.

Sweetpotato weevil control activities.---Surveys for sweetpotato weevils were made along with the eradication work in November, cooperatively with the States. Such inspection of the volunteer sweetpotato plants and of fields after harvest resulted in the location of several infestations, principally in Texas, including infestations in the three counties recently added to the eradication areas. All infested properties are being cleaned and fields replowed. Killing frosts occurring over the eradication areas of the various States the latter part of November are helping to rid the fields of left-over host plants. The inspection of approximately 17,500 bushels of sweetpotatoes in commercial storage houses at two points in Texas resulted in finding no weevils. Formerly infested properties in Lawrence County, Miss., were inspected without finding any weevils in that county. Further checks will be made to determine whether the infestations may have been eradicated. From July 1 to November 30, infestations have been found as follows:

State	: Counties	:	Properties
	: infested	:	infested
	: Number	:	Number
Alabama-----:	2	:	165
Georgia-----:	2	:	15
Mississippi----:	8	:	127
Texas-----:	7	:	328

Eighteen Federal and 23 State inspectors were employed on the work in November.

Peach-tree-removal work speeded up.--With the assistance of an increased force of relief employees averaging 890 in November and with the completion of the seasonal inspection work, all activities of the peach mosaic and phony peach project were concentrated on the removal of diseased, abandoned, and escaped peach trees in 10 States. An increased number of waivers was obtained during the month for the removal of such trees in the mosaic-infected districts of California, and good progress is being made in that work. State-hired tractors are being used in those areas where practicable. In the period from July 1 to October 31 nearly 84,000 diseased trees and over 500,000 abandoned and escaped peach trees had been removed from the various infected States.

All phony trees removed from Georgia.--Nearly 77,000 peach trees were found infected with the phony peach disease in Georgia in the season of 1938. The removal of all these trees--as well as those found infected in 1937, which was completed on November 19--represents a marked advance in control of the disease in this heavily infected area. Work is now in progress on the abandoned and escaped trees in 18 counties of that State.

Transit-inspection force increased for Christmas shipping.--Nine inspectors from the gypsy moth control project are being assigned to transit inspection at northeastern points during the Christmas shipping season for the inspection of truck movement of Christmas trees, of wholesale flower markets at New York City, and of restricted materials moved to the Worlds Fair Grounds, and also to assist regular transit inspectors in checking mail, express, and freight.

Transportation employees cooperate in quarantine observance.--Express employees at one of the large railway centers of the Northeastern States are, according to the transit inspector in charge, of vital assistance to the project in making a practice of inquiring thoroughly as to contents of all shipments likely to contain restricted materials and insisting upon certification when such is required. Instances were noted of the refusal of floral wreaths containing uncertified laurel and hemlock from the gypsy moth area, and of burlap bags containing marble chips from the same area. Freight foremen and car checkers handling the transfer of shipments are equally efficient in holding up any uncertified consignments and reporting them through regular channels to the agent of the receiving station, who is requested by superior officers to explain the acceptance of the shipment. Freight transportation companies continue to report to transit inspectors information as to shipments of nursery stock over their lines. One of the important freight yards in the Chicago district, covering an area 5 miles long and half a mile wide, was recently equipped for electric operation and has thereby speeded up activities to the point where 10,000 cars pass through the yards every 24 hours.

Recent interceptions.--The inspection of shipments in transit at 14 important railway centers, for compliance with domestic Federal plant quarantines, resulted in finding in November 223 apparent infringements in shipments consigned to 34 States, the District of Columbia, and Canada. Uncertified materials were found in containers bearing the labels "Greenhouse-grown - No inspection required" and "Inspection tag attached." Information provided as to observations of shipments of ant colonies in soil and of small wooden reels led to the investigation of such shipments and the application of certification and permit provisions.

Nurseryman fined for shipping Ribes without permit.--A fine of \$100 was recently imposed in the case of a Midwestern nurseryman who was found guilty on four counts in failing to obtain control-area permits in shipping currant and gooseberry plants to certain other States which maintain areas free from these plants.

Citrus canker eradication.--Eighteen Federal and State inspectors and 200 W. F. A. workers are employed at present on citrus canker inspection and eradication in Texas, working principally in the Houston area. The removal of some abandoned nursery and dooryard trees in other parts of the State was begun in November. In the four infected counties of Texas--Brazoria, Galveston, Harris, and Jefferson--there are 22 nurseries that have 87,265 citrus trees to be sold locally. These nurseries are given rigid inspections just before the shipping season. Other citrus trees in the infected area total 112,156 on 3,495 properties, of which 37,677 are Citrus trifoliata in a few hedges and the remainder principally satsumas and kumquats, which are resistant to canker. The repeated use of flame throwers and chemical solutions on all formerly infected properties is reducing citrus canker. Only one new case, and that in an old area, and three recurrent cases have been found thus far in 1938.

CONTROL INVESTIGATIONS

Pyrethrum evaluation.--M. S. Lowman, of the Bureau of Plant Industry, and W. N. Sullivan of this Bureau, reported (Soap, vol. 14, no. 14: pp. 89-93, 119) on the relation of pyrethrin content of pyrethrum flowers to their toxicity to mosquito larvae. The correlation between toxicity and the percentage of Pyrethrin I and the correlation between toxicity and total pyrethrins were found to be about equal, except in samples with unusually high or low proportions of Pyrethrin I. One test in duplicate against the larvae was found to be sufficiently accurate to indicate samples of high or low toxicity, and for this purpose the method has been found to be of value in handling the large number of samples involved in developing strains of high pyrethrin content.

INSECTICIDE INVESTIGATIONS

Relation between chemical constitution and toxicity of organic compounds.--This subject, which has engaged the attention of many biologists, pharmacologists, and chemists, has been studied by W. A. Gersdorff, of this Division, using the goldfish as the test organism. It was found that when the oxygen in cresol is replaced by sulphur, the toxicity is greatly enhanced. The para compound is more toxic than the meta and this in turn is more toxic than the ortho. Para-tolyl mercaptan is about eight and a half times as toxic to the goldfish as phenol. A report of this work is published in Protoplasma (vol. 31, no. 2, pp. 199-206, 1938).

Stability of derris deposits.--R. D. Chisholm and L. D. Goodhue, working at the Japanese beetle laboratory, Moorestown, N. J., have recently reported (Soap, vol. 14, no. 12, pp. 117, 119, 131, December 1938) a method for studying the effect of rain and sunlight upon derris deposits under laboratory conditions. Exposure to a mercury vapor arc for 8 hours causes about the same percentage of decomposition in a derris deposit as does exposure to sunlight for 5 days.

Review of literature on derris and cube.--The Division of Insecticide Investigations has recently issued two mimeographed publications, E-453 and E-457, reviewing recent literature on *Lonchocarpus* and popular articles on derris, respectively. The interest in these rotenone-bearing plants is indicated by the 480 references to cube, most of which were published during the last 3 years.

BEE CULTURE

Fungus attacking queen larvae and sealed cells.--In recent queen-rearing work at the Southern States bee culture laboratory, Baton Rouge, La., at least one of each lot of cells placed in an incubator after the cells were sealed was found to contain a dead larva attacked by a fungus. C. E. Burnside, of the Beltsville, Md., laboratory, identified this fungus as *Aspergillus niger*. He states, "There seem to be no published reports of *A. niger* attacking queen larvae in sealed cells."

IDENTIFICATION AND CLASSIFICATION OF INSECTS

Taxonomic study in connection with the Mormon cricket problem.--A large collection of the Mormon cricket and allied species was recently received for study and identification from the Division of Domestic Plant Quarantines. It comprised 59 lots preserved in a 4-percent solution of formaldehyde and contained an estimated total of nearly 4,000 specimens, from North Dakota, South Dakota, Nebraska, Montana, Wyoming, Idaho, Utah, Washington, Oregon, and Nevada. This probably represents the finest assemblage of such material ever made available for taxonomic study. Only preliminary examination has been possible thus far, but this shows the following species, as tentatively identified, to be present: *Anabrus simplex* Haldeman, *Anabrus cerciata* Caudell, *Anabrus longipes* Caudell, *Anabrus spokan* Rehn and Hebard, *Peranabrus scabricollis* (Thomas), *Apote* sp., *Pediodes* *stevensonii* (Thomas), *Pediodes* *haldemani* (Girard), *Pediodes* *nigromarginata* (Caudell), and *Steiroxys* sp. As was expected, the Mormon cricket (*A. simplex*) was much more abundantly represented than any of the others, specimens being present in 48 of the 59 lots. There are a number of perplexing taxonomic problems involved in a study of this group, for specific and varietal limits have not been at all satisfactorily determined. However, it is hoped that a rather detailed report can be made available to field workers for the 1939 season, including identification keys to the genera and species, illustration of taxonomic characters, discussion of features most valuable in field recognition, and certain other information, with an indication also of situations from which further material is needed.

Distribution records for an injurious leafhopper.--The discovery of specimens of *Cicadulina bipunctella* (Matsumura) [synonym: *Cicadulina zeae* China] among material collected in Guam in May 1936 by O. H. Swezey and R. L. Usinger, led to further inquiry concerning the distribution of this interesting African species. Zachwatkin, in 1935, recorded its occurrence in Yemen, Arabia, and this appears to be the only published record of its occurrence outside of Africa; however, the National Museum Collection contains specimens from Japan and the Philippine Islands. *C. bipunctella* is of particular interest because it has been recorded, under the name *C. zeae* China, as being injurious to maize in Kenya Colony, Africa. The closely

related species C. mbila (Naudé) is recorded as transmitting streak disease of maize in Natal, and C. arachidis China and C. similis China are injurious to "ground nuts" in the Gambia, and suspected of transmitting the virus of the rosette disease of that plant. No species of the genus, other than bipunctella, is known to occur outside of Africa. The Guam specimens of bipunctella were from corn and grass, but in the Japanese, Philippine, and Yemen records no information concerning hosts was available.



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UNITED STATES
DEPARTMENT OF AGRICULTURE

FEB 4 1906
U. S. DEPARTMENT OF AGRICULTURE



BUREAU OF
ENTOMOLOGY AND PLANT QUARANTINE
NEWS LETTER

VOLUME VI

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

NEWS LETTER

FOR DECEMBER 1938

Vol. VI, No. 2

(Not for publication)

February 1, 1939

BUREAU WORKERS AWARDED MEDAL

E. H. Siegler, of the Division of Fruit Insect Investigations, and Lyle D. Goodhue, of the Division of Insecticide Investigations, have been awarded the annual medal by the Eastern Branch of the American Association of Economic Entomologists, for their paper entitled, "The Effect of Particle Size of Some Insecticides on Their Toxicity to the Codling Moth Larvae," which was presented at the Baltimore Meeting. The annual award was first granted at the 1938 meeting and will continue to be made annually for the paper presented at the Annual Meeting of the Eastern Branch that shall represent the best contribution to the science of economic entomology.

FRUIT INSECT INVESTIGATIONS

Codling moth larvae make good fish bait.--One way to reduce the numbers of overwintering larvae of the codling moth is to use them for fish bait. E. J. Newcomer reports that Don Gladson, a former employee of the Yakima, Wash., laboratory, in looking for part-time employment during the winter, hit on the idea of collecting and preserving codling moth larvae and selling them to fishermen. He worked out his own methods of collecting, killing, and preserving the larvae to make them white. He puts three dozen in each vial and sells them wholesale to sporting-goods stores. There is much winter fishing for whitefish (Prosopium williamsoni Girard, and P. oregonium Jordan and Snyder) in the Yakima River and its tributaries. One of the common baits used has been the white larva of the goldenrod gall fly (Eurosta solidaginis Fitch). This winter these larvae seem to be scarce, therefore the demand for codling moth larvae has been good.

Flight habits of *Tribolium castaneum* (Hbst.).--This insect, known as the red flour beetle, occurs in stored raisins along with *Tribolium confusum* Duv., said to be a nonflying species. Neither can be said to be abundant in an average year. One record of evening and night flight of *T. castaneum* was obtained by Dwight F. Barnes and George H. Kalcstian, of the Fresno, Calif., laboratory, by means of collections removed from a rotary net every 15 minutes, from 5 p.m., September 7, to 7 a.m., September 8. The data are as follows:

:Beetles::		:Beetles	
Time	: taken ::	Time	: taken
p.m.	:Number ::	p.m.	: Number
6:15-----	: 1	:: 8:45-----	: 2
6:30-----	: 7	:: 9:30-----	: 1
6:45-----	: 51	::10:45-----	: 1
7:00-----	: 8	:: a.m. :	
7:15-----	: 9	::12:30-----	: 1
7:30-----	: 8	:: 2:15-----	: 1
7:45-----	: 6	:: 2:30-----	: 1
8:00-----	: 1	:: 3:30-----	: 1
8:15-----	: 1	::	

Sunset was at 6:19. The record indicates that the red flour beetle is on the wing chiefly early in the evening, when light meter readings have nearly reached zero.

During the period from April 14 to October 31, 1938, the net captured 3,461 red flour beetles, as follows: April, 0; May, 20; June, 5; July, 2; August, 377; September, 2,719; October, 338.

MEXICAN FRUITFLY CONTROL

No larval infestations found.---The first Mexican fruitfly trapped during the present harvesting season was taken on December 14. From that date until the end of the month seven more flies were taken on four other premises. While the number of flies trapped so far this season is somewhat below the seasonal average, it is evident that the annual migration of flies is taking place. Intensive grove inspections throughout the entire regulated area this season have failed to disclose any larval infestations. The combination of extremely dry weather and low prices for both oranges and grapefruit continues to plague the growers in the lower Rio Grande Valley. Many growers are delaying the harvesting of their crops, hoping for better returns and increased tonnage. As the early harvesting of fruit in this area is a distinct advantage in control work on the Mexican fruitfly project, the poor market conditions and dry weather now being experienced may be the factors which will determine the extent of infestation in this area later in the spring.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Outstanding resistance to hessian fly again shown by Marquillo-winter wheat hybrid selections.---Elmer T. Jones, of Manhattan, Kans., reports that in fly-resistance tests, recently completed at Springfield, Mo., 62 winter-habit hybrid selections of F₇ generation involving crosses between winter wheats and fly-resistant Marquillo have again shown outstanding resistance. Thirty-four rows of varieties of known and unknown susceptibility distributed uniformly throughout the test series developed an average infestation of 73 percent, against 2.9 percent for the Marquillo hybrids. F₄ backcrosses and complex crosses involving some of these hybrids in the same tests were found to be comparable to their resistant parents in reaction to infestation.

Many of the F₇ hybrids are also being grown and tested by John H. Parker, experiment station agronomist. Some have been outstanding in yield tests. Carotene tests of four selections of Marquillo x Tenmarq gave a range of carotene of 2.5 to 3.0 parts per million. Four selections of Marquillo x Oro ranged from 1.8 to 2.1 parts per million. With Marquillo at 4.8, Tenmarq at 2.9, and Oro at 2.7 parts per million, it will be seen that some of these hybrids have a lower carotene content than their winter parents, an exceedingly desirable characteristic.

Rice weevil infestation of corn in the field.--R. T. Cotton, Manhattan, reports that an examination of corn in the field in November indicates that the rice weevil does fly to the fields in Kansas and Missouri and starts infestations in the maturing corn. Field infestations of corn by the rice weevil are not extensive in Kansas this year, but in southwestern Missouri 50 percent of the fields examined were infested.

JAPANESE BEETLE CONTROL

Nursery and greenhouse certification activities.---Inspectors from the Richmond office treated 101 Old English boxwoods and a ginkgo tree with carbon disulfide prior to certification. A large nursery in central New Jersey, at which an inspector is stationed all year, reported a total of 41,679 shipments made during 1938, an increase of 727 shipments over 1937. Approximately 50 percent of these were made under Japanese beetle certification. There was an increase of about 45 percent in the number of plants certified from New Jersey nurseries and greenhouses. Requests for paradichlorobenzene treatments of azaleas indicate heavy demand for these plants. There was an increase of nearly 350 percent in the number of azaleas treated with this material, as compared with those treated in December 1937. New Jersey sand establishments showed a gain of 19 carloads over last year. One of the certified sand companies is installing a new crusher for the purpose of manufacturing "fine flour sand." Tests of methyl bromide as a fumigant for potted plants are being continued in cooperation with the Division of Control Investigations. Several of the larger nurseries have cooperated by supplying quantities of plants for the trials. It will be necessary to conduct tests on each species and variety before recommendations may be made as to the feasibility of using this type of fumigation. On the Eastern Shores of Maryland and Virginia approximately 30,000 fruit, nut, and shade trees, 30,000 items of general nursery stock, and 125 strawberry plants were offered for inspection and certification by class III establishments. Notwithstanding heavy freezes, one nursery in this area required the full-time services of an inspector. This establishment shipped nearly 27,000 fruit, nut, and shade trees.

Bermuda requires Japanese beetle certification.---Requests received during the month from two New York State nurserymen for inspection of plant material and issuance of Japanese beetle certificates to cover material destined to Bermuda brought to light a new policy on the part of the Bermuda Department of Agriculture. Permits to individuals or firms in the Japanese beetle regulated area, authorizing the exportation of plant material to Bermuda now contain, in addition to the usual provisions, the clause "provided they are certified free from Japanese beetle by an authorized official

of the United States Department of Agriculture and accompanied by an 'A' certificate (Form EQ-644-b)." This precaution is evidently motivated by the observations made by J. W. Waterston, plant pathologist of the Bermuda Department of Agriculture, on his visit to the heavily infested Japanese beetle regulated area in the summer of 1938. One of the consignments certified for shipment to Bermuda required the freeing from soil of a number of expensive imported plants being shipped from a Long Island estate to the owner's Bermuda winter home. The estate superintendent, after cabling the owner in Bermuda, decided to chance removing the soil to meet certification requirements, although some of the plants may not survive this treatment.

Three counties shift from Federal- to State-administered W. P. A. funds.---Effective at the close of December 8, the entire Federal security wage personnel in Bergen, Morris, and Passaic counties, N. J., with the exception of 8 men, was transferred from W. P. A. funds administered by the Federal district W. P. A. office in New York City to funds allotted through the State W. P. A. This transfer involved approximately 450 men. The field work in these 3 counties will be carried on as before under the direct supervision of the appointed personnel of this Division; however, all matters relating to time and payroll details will be handled exclusively by State W. P. A. officials.

Special aerial survey to determine cost of elm elimination.---On December 27 work was started on a special survey to determine the cost of elm elimination in mountainous sections within the Dutch elm disease work area. Four representative plots have been selected for survey, each including approximately 5 square miles. Systematic surveys will be conducted in each of these plots by a 3-man crew composed of 1 autogiro observer and 2 W. P. A. ground workers. The observer will plot on aerial photographic maps the exact location of all elms over 2 inches DBH, together with certain other information, such as estimated DBH, species, value, condition, and the type of terrain in which situated. The two ground workers will fell 100 elms in each plot. The felled trees will be trimmed so that the trunks rest on the ground. They will be left until later in the season when they will be examined to determine the extent of elm bark beetle infestation.

Timber survey continued.---At the beginning of the month two Bureau-owned autogiros were still engaged in the timber-damage survey being conducted by the New Hampshire Fire Hazard Reduction and Timber Salvage Commission. On December 11 the State discontinued use of the small autogiro because of the short flight range of the ship and the necessity for flying greater distances from the Concord Airport. The 460 horse power cabin plane was grounded for a few days while repairs were made to the rotor system. During the week ending December 31, the latter autogiro crew surveyed some 235 square miles of woodland area. Additional territory assigned for survey includes the Mt. Cube and Rumney quadrangles.

Eradication even with Connecticut confirmations.---For the first time since June 11, the State leader in Connecticut was able on December 17 to report no confirmed trees standing. This is an unusual condition for Connecticut, since in previous summers only 1 eradication crew has been employed and it has been necessary to supply them with dead and dying tree

removals to keep them busy between eradication of diseased trees. There were times last summer when 66 men devoted their entire time to eradication of elms infected with Dutch elm disease. Total confirmations in the State during 1938 numbered 535.

Police provide protection for elm-sanitation workers.--With the assistance of two Pennsylvania motor policemen, sanitation work on two properties in Upper Mt. Bethel Township, Northampton County, was completed in mid-December. Owners of the properties tried to make it difficult for the men to work. Accordingly several crews working under police protection were detailed to the properties and disposed of the entire job in 2 working days.

Check made on nursery stock received at New York World's Fair.--Following reports from several of the New England district inspectors indicating the possibility that wild collected stock, as well as uncertified nursery stock, might be moving from the gypsy moth infested area to the New York World's Fair, a check was made from December 19 to 23. Arrangements were made with the Fair officials to have all nursery stock admitted only at the Horace Harding Gate. It was found that most of the arriving stock came from nurseries within a radius of 100 miles from New York City. Records of all stock received during the period April 7 to December 19 failed to show any stock moved contrary to a plant quarantine.

Christmas tree inspection.--Inspection of Christmas trees and greenery was completed on December 24. There was a considerable decrease in the number of Christmas trees offered for inspection and certification as compared with 1937. Curtailment of cutting operations, due to warm weather early in the season, accounted for most of the decrease. There was an increase this season in the quantity of Christmas greenery inspected prior to manufacture into wreaths, roping, and decorative pieces. Among lots of mixed greens inspected were nine in which infestation was found. Twenty-two gypsy moth egg clusters were removed and destroyed. Five of these consignments were inspected at Portland, Maine, with single shipments each originating at Auburn, Brunswick, Falmouth, and Westbrook, Maine. After certification the shipments were dispatched to Calais, Maine; Minneapolis, Minn.; Capac and Grand Rapids, Mich.; Summit, N. J.; Brooklyn and New York City, N. Y.; Toledo, Ohio; and Memphis, Tenn.

Exhibit material infested.--Thirty-three gypsy moth egg clusters have been removed from materials thus far assembled by the State of Maine Inland Fish and Game Commission for exhibits to be erected at the New York World's Fair and at the Sportsmen's Shows in Boston and New York City.

Pulp shipments resumed.--Plans are now being made to ship from central New Hampshire to paper mills in northern New York 80 cords of pulpwood per day for a period of 90 days. Very little pulpwood has been inspected in this section thus far this season.

FOREST INSECT INVESTIGATIONS

Parasite worker returns from France.--W. F. Sellers was transferred on December 1 from the Saint Cloud, France, Laboratory of the Division of Foreign Parasite Introduction to the New Haven, Conn., laboratory of the Division of Forest Insect Investigations. For the past 8 years Mr. Sellers has been in Europe engaged in parasite work, giving particular attention to parasites of forest insects.

Dutch elm disease recovered from adult elm bark beetles.--In the spring of 1938 the Morristown, N. J., laboratory cooperated with the Dutch elm disease eradication unit in placing elm trap trees in outlying areas where trees affected by the disease had previously been found and removed. Adults and galleries of the two elm bark beetles, Scolytus multistriatus Marsh. and Hylurgopinus rufipes Eich., were subsequently removed from these trees and cultured by the Bureau of Plant Industry to determine whether the fungus (Ceratostomella ulmi) which causes the disease was present. One of the areas where the trap trees were put out lies partly in Cumberland, Md., and partly in Wiley Ford, W. Va., across the Potomac River from Cumberland. The fungus was recovered from two adults of H. rufipes taken from a trap tree in this area. Recently the Dutch elm disease eradication unit has been collecting adults of this species from the hibernation tunnels that they have formed in the bark of living elm trees in the area. These adults have been cultured by the Bureau of Plant Industry. To date Ceratostomella ulmi has been recovered from one adult H. rufipes taken from a tree about a mile distant from the trap tree from which the two adults contaminated with the fungus were taken earlier in the year.

Elm bark beetles attracted by adults caged on logs.--Field observations on the habits of the smaller European elm bark beetle (S. multistriatus) have shown that some elm wood is heavily attacked by it, whereas other wood in the same location and apparently in the same condition is lightly attacked or not attacked at all. The reason for this selectivity is not known but the results of an experiment conducted by R. R. Whitten, of the Morristown, N. J., laboratory, help to explain the reason. These results show that the presence of beetles on a log attracts other beetles. Early in August 1938, 22 logs, 4 feet in length and from 3 to 6 inches in diameter were cut from 4 elm trees. They were separated into 11 pairs so that both logs of each pair were from the same tree. All logs were "seasoned" in a screened cage for 10 days and then exposed for a period of 5 weeks in a large wooded area where the S. multistriatus population ranged from light to heavy. While the logs were scattered over a large area, those of each pair were placed not over 6 feet apart. The day the logs were placed in the field 2 male and 2 female S. multistriatus adults were caged at each of 4 points on 1 of each pair of logs. At the end of 5 weeks the logs were debarked and the maternal galleries of S. multistriatus were counted. While this was being done it was noted that only 1 of the caged females had made a maternal gallery. Most of the others had not contacted the xylem, although they had fed upon the bark. The following table shows the number of maternal galleries found in the logs. It will be noted that a significantly greater number of galleries were found in the logs on which beetles were caged.

Description of logs	: Logs	: Average bark : area	: Mean : galleries	: Sun : of
			per log ^{1/}	squares
	Number	Square feet		
Without caged beetles----	11	4.44 ± 0.31	5.6	1,553
With caged beetles-----	11	4.46 ± .35	25.7	6,608

^{1/}Difference = 20.1 (significant).

Minimum forest-air temperatures.--For the third consecutive winter the Portland, Oreg., laboratory is obtaining minimum air-temperature records under actual forest conditions, according to J. M. Whiteside. These data are being taken in connection with investigations concerning the natural control of populations of the western pine beetle (Dendroctonus brevicornis Lec.) through low winter temperatures. A total of 49 stations have been established at accessible points over a rather large portion of the ponderosa pine region, where periodic readings are being taken by interested cooperators living within the forest proper. This area includes the Yakima Indian Reservation and Klickitat County in Washington, and the Mt. Hood National Forest, Warm Springs Indian Reservation, Deschutes, Ochoco, and portions of the Malheur and Fremont National Forests in Oregon. Of this total number of stations, 33 will be recording daily minimum temperatures, 9 weekly, 4 monthly, and 3 the minimum for the winter. These readings will be checked against those recorded at the standard Weather Bureau stations, usually situated out of the timber in more exposed locations, in order to determine the variation between forest air temperatures and those taken regularly at the permanent stations.

Sex ratio of the Black Hills beetle.--According to Donald De Leon, of the Fort Collins, Colo., laboratory, preliminary counts on the proportion of the sexes of the Black Hills beetle (Dendroctonus ponderosae Hopk.) emerging from two of its host pines in the Rocky Mountain region were as follows:

Locality	: Year : of	Females		: Total
		: Ponderosa:	: Limber:	
	emergence:	pine	pine	counted
		Percent	Percent	Number
Evergreen, Colo-----	1937	57.0	--	510
Estes Park, Colo-----	1938	60.8	--	838
Elk Mountain, Wyo-----	1938	--	55	792

It is planned to make more extensive counts to determine whether this variation is caused by inadequate sampling or by seasonal or regional differences.

Notes on pandora moth in Colorado.--The preserved bodies of 50 female pandora moths collected around blue neon lights at Granby, Colo., on August 2, 1938, which presumably flew there from the infestation on the

Arapaho National Forest, were opened by N. D. Wygant, Fort Collins, and were found to contain an average of 19.7 eggs. Thirteen of the moths contained no eggs and the most found in any moth was 97. The average number of eggs in 27 newly emerged moths was 153.1. These figures indicate that 87.2 percent of the eggs were laid before the flight to the lights. In the field eggs started to hatch the middle of August and on August 27 about half of the eggs were hatched. On September 20 a few unhatched eggs could be found on the north exposures. About 3 percent of the larvae are overwintering in the first instar, about 93 percent in the second instar, and 4 percent in the third instar. Most of the larvae hibernate singly, but occasionally in groups up to 6, more or less wedged between the needle bundles and attached with a little webbing.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Transportation to working areas difficult during first half of month.--In New England gypsy moth crews experienced considerable difficulty in reaching their working areas during the first half of December, owing to the condition of the dirt roads in many areas.

Amount of timber felled by hurricane in barrier zone appears underestimated.--In the gypsy moth barrier zone area there is considerably more hurricane-downed timber than was previously supposed. Because many of the most seriously damaged areas are in extremely remote localities, or on the opposite slope of the ridges, they cannot be seen from the roads.

Portable pumps now used to extinguish brush fires.--Knapsack-type water pumps, designed especially for fighting forest fires, are in almost daily use by gypsy moth crews wherever brush or forest debris is being burned.

Three small gypsy moth infestations found during special scouting work in Maine.--Check-up work at the sites of gypsy moth infestations located in Washington County, Maine, during the fiscal year 1938 was completed on December 7. No infestation was discovered during the current fiscal year in the town of Princeton, where approximately 1,455 acres of woodland and open country were examined. Three infestations, totaling 10 egg clusters, were found and destroyed by creosoting during the scouting of about 2,140 acres in Calais. One of these infestations consisted of 8 egg clusters, and only 1 egg cluster was found at each of the other 2 sites. The 4 supervisory employees temporarily assigned to this special scouting have been returned to work in the barrier zone area.

Arrangements made to inspect wood moved from infested section of barrier zone.--A novelty company recently moved from New Jersey to Canaan, Conn., where there is an abundance of white and gray birch needed in the manufacture of various novelties. While their new location is within the barrier zone and is not covered by the gypsy moth quarantine, arrangements have been made to inspect all the material shipped by them.

Spruce trees dug up for temporary use as Christmas trees.--Many large spruce trees growing within the area regulated on account of the gypsy moth on Long Island, N. Y., were dug up with a ball of earth and sold as large

Christmas trees. In a few instances these trees were rented to church and school organizations, and will be returned and replanted in the nurseries shortly after New Year's Day.

New mine timber operation will impede future gypsy moth work.--A mine timber operation has recently been started near the site of a sizable gypsy moth infestation located during the current fiscal year in the township of Kingston, Pa. This infestation is situated on the west side of the Susquehanna River opposite Wilkes-Barre. Although the cutting of mine props and lagging at this infested site will not interfere with the scouting and selective thinning work yet to be done there this season, it will undoubtedly seriously impede the progress of spraying work next June.

Used crank-case oil employed in burning brush and forest debris.--Discarded wiping rags soaked in used crank-case oil have proved to be an excellent kindling agent in burning piles of brush and forest debris, especially when the brush is wet or green. All oil drained from motors used in gypsy moth work in the Pennsylvania area is now saved and issued to crews engaged in disposing of brush, which accumulates during selective-thinning operations.

Hundreds of shots fired in one area by deer hunters.--Gypsy moth employees were withdrawn from the woods during the deer-hunting season, and reports from one area demonstrate the advisability of such a procedure. Each of 742 hunters reported the killing of a deer in the Hickory Run section of Kidder Township, Pa., during the week ending December 3, and many others were unsuccessful in their efforts. The total number of deer killed does not indicate the actual number of shots fired in this rather restricted area, but it shows clearly why it is unsafe for employees of this project to work in heavily forested areas where hunting is permitted during the open season on deer.

C. C. C. gypsy moth work still curtailed by emergency operations.--C. C. C. gypsy moth work is still curtailed materially by the use of gypsy moth crews on emergency work made necessary by the hurricane and flood of September 21. The extent of this curtailment is typified by the report for the week ending December 17, which shows 658 6-hour man-days used on gypsy moth work supervised by this Bureau, while 1,856 man-days were taken from gypsy moth work and used on emergency operations. A total of 20,208 man-days of gypsy moth work was used on emergency duties from September 21 to December 17, exclusive of additional time used by several foremen taken from gypsy moth camps to supervise emergency crews detailed from other work. Gypsy moth work was being done from only 2 camps in Massachusetts and 2 camps in Connecticut during the middle of December. The men were employed chiefly in selective thinning and burning work at the sites of heavy infestations, although a little scouting was done. Since the first of July more than 930,000 new gypsy moth egg clusters have been creosoted in Massachusetts, over 1,679,000 in Connecticut, and approximately 36,000 in Vermont. In addition to this, it is estimated that slightly more than 163,000 egg clusters have been destroyed by burning brush and forest debris in Connecticut.

PLANT DISEASE CONTROL

Many rust-susceptible barberries destroyed in nurseries outside protected area.--During 1938 more than 23,000 rust-susceptible barberry bushes were destroyed in nurseries outside the area protected by quarantine No. 38 (revised), preparatory to qualifying these nurseries for Federal permits to ship immune species into the States comprising the rust-control area.

Physiologic races of stem rust identified in 1938.--During the winter of 1937-38 specimens of rusted wheat collected at more than 40 different points in southern Mexico were found to contain only 3 different parasitic races or strains of the stem rust fungus. Of these, race 59 constituted 58 percent of the isolates, race 38, 37 percent, and race 24 was found in only 1 collection. Neither race 59 nor race 38 attacks Marquis wheat normally. This accounts for the fact that Marquis wheat is widely grown as a rust-resistant variety in certain areas in Mexico. In northern Mexico 9 races were found. These were 38, 49, 56, 17, 19, 36, 11, 32, and 59 (listed according to their prevalence). All of these races were subsequently found in the United States. One of the most striking results of the stem rust survey conducted in 1938 is the fact that race 56 was not found at all in southern Mexico, although it constituted about 15 percent of the isolates made from collections obtained in northern Mexico, and subsequently became by far the most prevalent in the United States. The history of race 56 is quite significant in view of its prevalence during recent epidemic years. Race 56 was identified for the first time in the United States in 1928. That year it constituted 1/2 of 1 percent of the isolates identified. Its increase in prevalence since that time is shown in the following table.

Year	: Percentage of uredial : isolates in United States
1928-----:	0.5
1929-----:	0.7
1930-----:	0.2
1931-----:	1.0
1932-----:	2.1
1933-----:	3.7
1934-----:	33.1
1935-----:	44.0
1936-----:	47.0
1937-----:	56.0
1938-----:	69.0 (Incomplete)

Rapid killing of pines at Pysht, Wash.--One of the early pine infection centers found in western Washington is at Pysht, on the Olympic Peninsula, only a few miles from the extreme northwestern corner of the United States. This center, located by scouts in the summer of 1927, consisted of infection in 74 northern and western white pines grown in 3 rows from seed planted in 1919. Because of the excellent opportunity to observe the effect of the rust on the 2 species, H. N. Putnam recorded the following infection data from 1927 to 1930.

Pinus monticola					Pinus strobus				
Year :	Examined :	Infected :	Cankers per in- fected tree :		Examined :	Infected :	Cankers per in- fected tree :		
	Number	Number	Percent	Number	Number	Number	Percent	Number	
1927--:	69	34	50	5	9	3	33	1	
1928--:	76	41	54	4	6	3	50	2	
1929--:	74	69	93	14	5	4	80	13	
1930--:	74	70	95	27	5	5	100	39	

No further examination of the trees was made until the fall of 1933 when it was found that of the original 74 trees only 10 were alive. These are heavily infected. At least 3 will die within the next year or two and the remainder within the next 5 or 6 years. The trees first became infected about 1924 when the pines were 5 years old. At present 86 percent are dead and in all probability the kill will be 100 percent within 25 years from the time they were planted.

Salt spray injures white pines in Connecticut.--Salt spray lashed as far as 45 miles by the recent hurricane severely damaged white pines in eastern Connecticut. It has been suggested that the salt concentration on the leaves caused plasmolysis, or a drying out of the cells. White pines were affected as far away as Pomfret and in many places looked as if they had been fire-killed. Ground juniper was the next heavily damaged, other sensitive trees being red cedar and hemlock. The most resistant tree to salt was the Colorado blue spruce, which is a native of the Rocky Mountains. Some of this spruce on the Rhode Island shore was entirely unaffected.

White pine shelterbelts valued highly in Iowa.--A recent survey shows that 80 owners place a high value on their white pine shelterbelts in Iowa, the average appraised value being \$836 per shelterbelt, or, reduced to a per acre basis, \$1,300. These owners indicated that the use of the shelterbelts for protection purposes was of paramount importance. This includes protection of homes, gardens, orchards, and livestock. Other uses listed were the improved appearance of the farmstead and a very limited use for fuel and lumber.

W. P. A. laborers taught to write their names.--In connection with the W. P. A. Blister rust control work in the Southern Appalachian States, it was noted that a number of the men in various States had to sign their names with a mark. In order to overcome this, R. G. Pierce and J. G. Luce evolved a method of teaching these men to write their names. This method, which is proving successful, consists of writing the man's name on the top line of a page in plain script. Each letter in the name is then written vertically down the left-hand side of the paper, one letter for each line. The man then practices copying each letter on these lines until he can write them plainly. Several lines are then provided for 20 to 40 signatures and the pupil uses them in practicing his own signature. The men practice writing their names on their own time after official work is completed. One of the crew foremen in Virginia reports that his men are getting along fine with their writing lessons and that they can now write better than some of the other men of the crew.

COTTON INSECT INVESTIGATIONS

Field populations of hibernating pink bollworms.--In an effort to determine the pink bollworm population left on the soil surface in fields following cutting and burning of cotton stalks, H. S. Cavitt and O. T. Robertson, of Presidio, Tex., examined samples of trash from 100 square yards in each of 20 fields in the Big Bend area. Only the surface material that could be removed by hand picking or raking, i.e., locks of cotton or bolls, were collected and examined. The fields from which the samples were taken represented various conditions representative of the entire Big Bend area. Some of the fields had not been flooded by the overflows of the Rio Grande that occurred in July and September; some had been flooded but the cotton had not been killed and continued to fruit late into the season and produced a large amount of heavily infested cotton; and in some fields the plants had been only partially killed by floods while in others they had been entirely killed by floods. The stalks had been cut and burned on different dates ranging from August 15 to October 31. The results of the trash examinations were as follows:

Class of fields	: Fields	: Date of	: Larvae
	: Number:	: clean-up	: per acre
Green but not flooded-----:	1	: Sept. 15-30	: 0
Do-----:	3	: Oct. 1-15	: 516
Do-----:	2	: Oct. 16-31	: 7,163
Flooded but not killed-----:	1	: Oct. 1-15	: 1,549
Do-----:	4	: Oct. 16-31	: 6,050
Partially killed by floods:	1	: Oct. 1-15	: 387
Do-----:	2	: Oct. 16-31	: 677
Killed by floods-----:	1	: Aug. 15-31	: 0
Do-----:	2	: Oct. 1-15	: 97
Do-----:	3	: Oct. 16-31	: 516

It will be noted that in all cases the earlier the crop matured and the earlier the fields were cleaned the fewer pink bollworms were found. The value of cleaning the fields early is strikingly shown by the increase in the number of worms per acre in the different classes of fields cleaned at successive dates. These examinations also indicate that if the stalks are cut and burned early in October the population will be so reduced that the expense of further reducing the population by hand picking or raking will probably be justified only in exceptional instances. Examinations of surface trash and soil for determining the larval populations were also made this year in 16 identical fields where examinations had been made in previous years. The average number of larvae per square yard found in trash above ground were 21.3 larvae in 1936; 51.5 in 1937; and 0.21 in 1938. The number of larvae found in the soil from the same areas where surface samples were taken were 4.37 larvae per square yard of soil in 1935; 7.75 in 1937; and 1.9 in 1938. However, all of the fields had been cleaned prior to sampling this year but had not been cleaned in 1936 and 1937, and the surface samples included both the trash on the soil and the material remaining on the plants. Frosts occurred earlier and temperatures were lower this year than in the previous 2 years and probably had some effect on the smaller

populations but the floods and the early maturity of the crop which permitted an early clean-up are believed to be the chief factors in the great reduction in the numbers of hibernating larvae remaining in the fields. The unusual amount of moisture left in the soil from the September floods is expected to further reduce the winter survival in the already light populations and to result in a marked decrease in the infestation next season.

Hemipterous insects and diseased cotton blooms.--The occurrence in unusual numbers of cotton blooms with spotted petals and deformed anthers in Arizona last season was studied by T. P. Cassidy and his associates of the Tucson laboratory. Although this condition has been observed previously it had not been noted in sufficient abundance to be of much importance. The affected squares have a brownish discolored area on the side of the bud usually just below the tip, which remains noticeable on the petals after the flowers have opened. Sometimes the deformation of one or more petals is so extensive that the flowers do not open properly. In the open blooms the symptoms are more obvious. A few or all of the anthers are discolored and brownish and the stamen filaments are usually so aborted that the stylus appears elongated and quite often with a brown lesion near the base. Generally the affected blooms do not set bolls and when bolls are produced from the diseased blooms the seeds appear unfertilized, grayish brown in color, and do not develop properly. John M. Breazeale and Dean Asquith examined 1,200 blooms of Upland cotton in the Yuma area on July 28 and 29 and found 46 percent of the blooms diseased, and 70 percent of the 400 Pima blooms examined early in August were diseased. They tagged 100 diseased Upland blooms and 25 Pima blooms and found a week later that 74 and 60 percent, respectively, had been shed. The high incidence of diseased blooms and shed occurred during extremely hot and humid weather in the latter part of July. As the weather became cooler the percentage of diseased blooms decreased and on August 21 only 10 percent of Upland and 35 percent of Pima blooms were affected. The diseased blooms appear to be caused by organisms introduced through the punctures of hemipterous insects. A number of organisms are probably involved in producing this type of bloom injury but they have not been determined. Pathologists of the Bureau of Plant Industry, to whose attention the diseased blooms were called, found that in every case examined one or more punctures made by hemipterous insects were present. Several species of insects are involved but the most important are thought to be Creontiades femoralis Van D., Lygus spp., and Corizus hyalinus (F.), but definite proof has not been established. In 2 plots that were dusted for insect control, Breazeale and Asquith found 34 percent diseased blooms and 68 percent in the 2 checks; in another test, 14 and 26 percent, respectively, were found in the dusted plot and in the check. In a cage containing 2 cotton plants and 3 C. femoralis and 1 Lygus hesperus at Bard, Calif., 14 hanging squares were found and 11 showed definite insect punctures. T. C. Barber found 25 squares, blooms, and small bolls shed on 2 plants in a cage with C. femoralis at Mesa, while the other cages contained only 2 to 3. The incidence of the diseased blooms and shedding squares also followed shortly after the maturity and cutting of alfalfa seed and the increase in insect populations in cotton fields. It was also noted that an unusual number of shed squares during this period remained hanging to the plants by shreds of bark attached to the limbs. Shed squares are often found hanging to the plants but not in the proportion found this summer. From the observations made it appears that the diseased blooms and the hanging squares are

associated with hemipterous insect injury, although their relationships have not been definitely established.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Pink bollworm in the Salt River Valley.--Last fall the pink bollworm was again discovered in the Salt River Valley of Arizona where it was eradicated during the years 1929-31. As a first step toward eradication of this pest from this area, it was decided to destroy by burning the cotton debris left in the field after picking, which is known to harbor the pest through the winter. This cotton debris is ordinarily left by the farmers in the fields or plowed under, as is most convenient. This makes it necessary, in an eradication campaign, to systematically set about its complete destruction. This work was started with a crew of 65 men. The standing stalks are cut, either by hand or with special sled cutters, after which they are piled and then the ground is gone over with fine-tooth rakes especially designed for this purpose. The raked-up material, consisting of useless pieces of cotton, leaves, and other materials, is placed on these piles of stalks and the whole is burned. To date 206 acres have been completed; however, these operations were hindered on account of rains, and in some cases it was necessary to wait until farmers had completed the harvesting of their crops. It is anticipated that within the next 6 weeks these operations will have been completed on from 5,000 to 7,000 acres immediately surrounding the infested spot, which is 6 miles east of Gilbert, Ariz.

Reports from the Big Bend of Texas.--Final ginning reports for this area for the season just closed showed 622 bales of cotton, as compared to 3,218 bales last season. This "almost" crop failure was due in a great part to the pink bollworm. Last season the corn ear worms destroyed a large part of the first bolls. Ordinarily, after these insects disappear, the cotton would have made a fair crop, but in that section the pink bollworm is so severe that it destroyed practically all the late bolls; hence, these two pests, working together, and some flood damage brought about very serious conditions. As a part of a 2-year plan to control the pink bollworm in this area, which is the most heavily infested on the North American continent, the cotton debris left in the fields has been destroyed as was described for the Salt River Valley of Arizona. These operations were carried out also on the farms surrounding Ojinaga, Mexico, immediately across the boundary from the infested area of the United States. Therefore, the 2-year plan started last fall has been well carried out in all this area in the United States and in Mexico, and it is anticipated that the second part of this plan, retarded planting in the coming spring, will be accomplished in an equally thoroughgoing manner.

The Texas Panhandle District.--In this Plains area it was estimated at the close of December that about 97 percent of the crop of cotton had been ginned. Ginning operations were slowed up somewhat on account of static electricity, the result of dry weather and high winds, and which has a tendency to cause fires in lint cotton. Also, the winds put much sand in the seed cotton, which is very hard on the ginning machinery. Besides these troubles, the lint and the seed were reduced in value. As many pickers go into that great cotton area for the fall and return after the picking season,

it is necessary to maintain road patrols to intercept parcels of cotton that might be carried out. In the examination of 5,424 pickers a total of 2,702 pounds of seed cotton and 55 pounds of cottonseed was intercepted and burned. Improved cooperation on the part of the pickers is being noted, many of them being found to have previously had their belongings well cleaned.

Survey work with autogiro.--In the lower Rio Grande Valley of Texas an effort is being made to eradicate the pink bollworm. A part of the program calls for killing the growing cotton plants early in the fall after picking operations have been completed, so as to prevent the pink bollworm from going into hibernation. In that subtropical country a field once planted to cotton continues to grow sprout cotton year after year, if the same is not destroyed. These areas of sprout cotton, many of them, turned out from cultivation, have now grown up into weeds and timber, offering a hazard to the successful termination of the eradication program. Hence, it was desired to locate all these isolated places in some manner and to eliminate this hazard. To effect this purpose an autogiro was borrowed from the Dutch elm project, and is now very successfully making these surveys. By means of this machine, carrying a pilot and a local observer, many areas containing cotton have been located, which otherwise had not been found and probably never would have been. It is easy to locate these plants from the air and it is now believed that within the next 2 or 3 weeks we will know definitely where every patch of abandoned cotton is.

Wild-cotton eradication.--Carrying forward the program of exterminating the wild cotton indigenous to southern Florida, to prevent the pink bollworms that are in it making their way to the main Cotton Belt, difficulties were encountered and overcome and satisfactory progress was made in December. Mosquitoes were extremely numerous at times, but this condition improved toward the end of the month. Work at Cape Sable was inaugurated early in the month, and 11 other crews were in operation in other areas. During the latter part of the month the Ten Thousand Islands section was completed for the first time this season. A total of 199,458 wild cotton plants was removed in the Cape Sable area, of which only 1,033 had mature bolls. While there is an increase in the number of seedlings this season over last, there is a decided decrease in the number of plants with mature bolls. A very encouraging decrease in the number of wild-cotton bolls is noted in counties along the west coast. A small colony of virgin cotton was found recently by the Bonita Springs crew.

Thurberia-plant eradication in Arizona.--Approximately 1,440 acres were covered in the Santa Catalina Mountain Range during December, and 18,070 Thurberia plants of all sizes were located and destroyed by burning. Work was completed in Finger Rock Canyon and the camp was moved to Pima Canyon the early part of the month. Considerable repair of trails had to be made before the pack train could pass over them. The canyon contained no water fit for human consumption, and it was necessary to haul from 300 to 400 gallons of water daily. The camp will be moved to Ventana Canyon early in January and the preliminary preparations, including the building of 5 miles of trail through rough territory, have been made. Accidents during the month were negligible and the health of the workers has continued good, despite inclement weather and very cold nights.

Laboratory inspection.--Two pink bollworm larvae were found from material collected early in December from fields located 5 and 7 miles northwest of Allende, Coahuila, Mexico. All available material from the Quemado Valley and other plantings nearest to this infestation on the American side was inspected in the San Antonio laboratory as soon as possible, but none was found to be infested with the pink bollworm. During the month 13,048 bolls of sea-island cotton from north Florida were inspected, with negative results as to pink bollworm but infestation of boll weevil was quite heavy.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Low wind velocities at night favor dusting for pea aphid control.--J. E. Dudley, Jr., and T. E. Bronson, of the Madison, Wis., laboratory, report that an analysis of the wind velocities at the experimental plots at Waunakee, Wis., during the 24-hour period of each day during June for the 3 years, 1936-38, inclusive, has shown that on an average during this monthly period, when dusting operations against Macrosiphum (Illinoia) pisi Kalt. are usually performed in Wisconsin, there was a total of 68 hours of daylight when the wind velocities ranged from 0 to 4 miles per hour, as compared to a total of 223 nocturnal hours when the wind was in the same velocity range. It is within this velocity range that dusting operations against the pea aphid can be most effectively performed under Wisconsin conditions. The analysis demonstrated further that the wind velocities remained within a range of from 0 to 4 miles per hour for consecutive periods of 3 hours or more at a time approximately two and one-half times as often during the night as during the daylight hours. These data indicate the desirability of applying dust mixtures for pea aphid control during the night whenever conditions will permit.

Adding conditioners to rotenone-containing dusts slightly increases efficiency against pea weevil.--T. A. Brindley and J. Linduska, of the Moscow, Idaho, laboratory, report that experiments with dust mixtures containing rotenone against Bruchus pisorum (L.) on garden plots in 1938 showed that the addition of various conditioners to the dust mixtures gave only slightly increased efficiency, as compared to dust mixtures composed solely of finely ground derris or cube root with talc or diatomaceous earth as a diluent. The results of these experiments may be summarized as follows: (1) Dust mixtures containing 1 percent of rotenone with talc as the diluent, which is now being used commonly by the growers, gave a control of 95.6 percent when applied to plots which were harvested as green peas and 94.6 percent in plots which were harvested as dry peas, as compared to comparable untreated plots. (2) A dust mixture containing 1 percent of rotenone with diatomaceous earth as a diluent, also being used commonly by the growers, gave a control of 98.9 percent in the green pea plots and 95.8 percent in dry peas. (3) A dust mixture containing 1 percent of rotenone with talc as a diluent plus 1 percent of lampblack, by weight, gave a control of 100 percent in the green pea plots and 90.4 percent in dry peas. (4) A dust mixture containing 1 percent of rotenone plus 2 percent of peanut oil, 1 percent of sodium oleyl sulfate as a wetting agent and 0.5 percent of water gave a control of 100 percent on green peas and 96.1 percent on dry peas. (5) A mixture containing equal parts, by weight, of a dust mixture containing 1 percent of rotenone with talc as the diluent and a dust mixture containing 0.45 percent of total pyrethrins with diatomaceous earth as the diluent gave a control of 99.6 percent on green peas and 89.9 percent on dry peas.

Results of dusting against pea weevil in Pacific Northwest.--F. G.

Hinman, R. A. Fisher, and T. A. Brindley report that a survey of the Blue Mountain area of Washington and Oregon at the end of the 1938 season revealed that over four times as much dust mixture containing rotenone was used against the pea weevil in this area as was used in 1937. In 1937 approximately 47.5 tons of dust mixtures containing rotenone, costing approximately \$10,925, were used to protect approximately 38,000 acres of peas. In 1938, with an acreage of approximately 34,000 acres, a total of 211.5 tons of dust mixtures containing rotenone, costing approximately \$37,780, were used. The general results of the control campaigns for the 2 years were nearly the same, since in 1937 there were 716 acres of peas, constituting 1.9 percent of the total acreage, discarded on account of the pea weevil damage, whereas in 1938 a total of 386 acres, or 1.1 percent of the total acreage, were discarded on account of pea weevil damage.

Sulfur and sulfur-pyrethrum dusts most effective against potato leafhopper on beans.--N. F. Howard, of the Columbus, Ohio, laboratory, reports that in comparing the efficiency of several dust mixtures and sprays against Empoasca fabae (Harr.) on beans during the course of experiments in Ohio in 1938, it was shown conclusively that dusts of undiluted sulfur or a dust mixture made up at the rate of 90 pounds of sulfur and 10 pounds of pyrethrum containing 0.9 percent of total pyrethrins gave best results in controlling this pest. Sprays containing basic copper arsenate, basic copper sulfate, sulfur nitride, and derris (0.015 percent of rotenone) were each ineffective. The addition of peanut butter to derris-dust mixtures increased their effectiveness, but these mixtures were not as efficient as undiluted sulfur or the sulfur-pyrethrum dust mixture. In general, the sulfur dusts were superior to sprays containing different materials.

Control of Mexican mealybug on chrysanthemums.--G. V. Johnson and C. A. Weigel, of the Beltsville, Md., laboratory, report that a very heavy infestation of Phenacoccus gossypii Towns. and Ckll. on chrysanthemums has been controlled by the use of two commercially prepared thiocyanate sprays used with and without a light mineral oil emulsion. These sprays were particularly effective against the mealybug nymphs. The sprayed plants made excellent growth, whereas the untreated check plants were practically ruined by the mealybugs.

Standard lead arsenate spray superior to derris, phenothiazine, or sulfur nitride against Colorado potato beetle.--R. H. Nelson and N. F. Howard, of the Columbus, Ohio, laboratory, report that in experiments performed during the summer of 1938 it was shown that standard sprays containing lead arsenate at the rate of 2 pounds to 50 gallons of water were far superior to derris sprays containing 0.015 percent of rotenone, phenothiazine (2 to 50), and sulfur nitride (22.9 percent pure) at the rate of 2 pounds to 50 gallons of water for the control of Leptinotarsa decemlineata (Say). Two applications of each of these sprays were made. Although slower in action, sulfur nitride compared favorably with phenothiazine and with derris at the expiration of 3 weeks after the second application; however, only lead arsenate gave satisfactory control at the expiration of the 3-week period. The addition of a varnish sticker to the derris spray did not improve the percentage of control.

Insect damage to shade- and sun-grown tobaccos in Florida.--F. S. Chamberlin and L. L. May, of the Quincy, Fla., laboratory, report that a survey of insect damage in 15 fields of shade-grown cigar-wrapper tobacco in the Quincy, Fla., district in 1938, revealed that the damage to tobacco in the fields under observation was caused principally by the tomato worm (Protoparce sexta (Johan.)), the tobacco budworm (Heliothis virescens (F.)) and the tobacco flea beetle (Epitrix parvula (F.)). In making this survey the injury caused to the leaves was rated according to the prevailing breakage rates which are based on the degree of soundness of the leaf. The results of the survey indicated that the average loss in the shade-grown cigar-wrapper fields due to hornworms, budworms, and flea beetles, was 0.1, 0.5, and 1.5 percent, respectively. In addition, 15 fields of sun-grown tobacco, which is used by the tobacco trade for several purposes, were examined to determine the degree of injury caused by hornworms and budworms. The leaf injury to this type was rated according to an arbitrary system based upon an apparent loss of weight, and was 1.4 and 4.4 percent, respectively, for hornworms and budworms. Sun-grown tobacco, which is produced for use as cigar binders, frequently sustains an additional loss by insects due to reduction in quality, but no method of estimating this phase of loss is yet available.

INSECTS AFFECTING MAN AND ANIMALS

Removing horse-bot eggs from horsehair.--Commercial concerns interested in the use of horsehair in their manufactured products often report difficulty in removing nits of horse bots from the hair. S. W. Simmons, of the Ames, Iowa, laboratory, has found that, of several materials tested for dissolving the substance which cements the egg to the hair, trypsin ($\frac{1}{4}$ % solution, pH 7.2-7.6) will dislodge all the eggs in 24 hours without apparent injury to the hair. Other materials tested did not effect complete separation of the nits without damage to the hair.

Increase in resistance to screwworm infestation.--E. W. Laake, of the Dallas, Tex., laboratory, reports that guinea pigs that have previously been exposed to two and three sublethal infestations of Cochliomyia americana C. and P. exhibit about twice the resistance to minimum lethal infestations as do animals which have never been infested.

Effect of viscosity on toxicity of fly sprays.--Preliminary experiments carried out by Craig Eagleson, Dallas, to determine the effect of viscosity of a fly spray on its toxicity toward Musca domestica L., gave no indication that the toxicity of a livestock spray is affected by the viscosity of the carrier.

Survey of Chaoborus larval population in Clear Lake, Calif.--A. W. Lindquist, of the Nice, Calif., laboratory, reports on a study of the population density of Chaoborus larvae during October, November, and December 1938, as follows: "A survey of the bottom of Clear Lake by means of an Ekman dredge shows the larvae fairly equally distributed but less numerous in the shallower waters within 2,000 feet of shore. The average number of larvae per sample at 6 stations on the big part of the lake, in 9 to 20 feet of water, was 149; at 5 stations in 21 to 25 feet of water, 283; and at 4 stations in 26 to 29 feet of water, 305. The average number of larvae on the lower part

of the lake at 5 stations in 30 to 42 feet of water was only 210. On the basis of the average sample, a larval population of from 230 to 1,400 per square foot, or from 12 to 61 million per acre, is indicated. Chaoborus larvae have continued their nightly migrations from the bottom mud to the upper strata of water as soon as the sun sets."

FOREIGN PLANT QUARANTINES

Entomological interceptions of interest.--Twenty-five living larvae of the Mexican fruitfly (Anastrepha ludens Loew.) were intercepted at Laredo, Tex., on September 8, 1938, in 3 pears in baggage from Mexico. Six larvae and 28 pupae, all living, of the olive fruitfly (Dacus oleae Gmel.) were intercepted at New York, on September 22, 1938, in olive fruits in baggage from Italy. Four living larvae of the pyralidid Hypsipyla grandella (Zell.) were taken at New Orleans on September 10, 1938, under the bark of a cedar log in cargo from Honduras. Living specimens of the coccid Puto mexicanus (Ckll.) arrived at San Francisco on June 20, 1938, on orchids (Laelia anceps) in express from Mexico. Living specimens of Haplothrips melaleucus (Bagnall) were intercepted at Honolulu, Hawaii, on April 12, 1938, on a leaf sheath of an orchid (Renanthera monachica) in the mail from the Philippines. A living larva of the olethreutid Laspeyresia splendana (Hbn.) was found at Philadelphia on October 17, 1938, among acorns in the mail from England. Living specimens of Anuraphis cynariella Theob. were taken at Boston on December 12, 1937, on globe artichoke in ship's stores from England. An adult of the weevil Tychius quinquepunctatus L. arrived at Seattle, Wash., on May 9, 1938, in vetch seed in cargo from France. A living specimen of the lygaeid Stygnocoris pedestris (Fall.) was found at Chicago, Ill., on September 27, 1938, on heather in the mail from Scotland. A living specimen of the coccid Lecaniodiaspis dendrobii (Dougl.) was taken at Washington, D. C., on August 2, 1938, on a pseudobulb of an orchid in express from Venezuela. A living larva of the olethreutid Laspeyresia membrana Heinrich was intercepted at Brownsville, Tex., on October 14, 1938, in a mesquite bean in baggage from Mexico.

Pathological interceptions of interest.--Albugo candida (Pers.) Kuntze was found on pods of Lunaria sp. in a shipment from Holland on October 20 at Philadelphia. Aphelenchoides tenuicaudatus de Man was intercepted in yams in baggage from Jamaica on September 15 at New York. Ascochyta sp. was intercepted on endive for the first time on December 21 at New York in a shipment from Belgium. Cephalobus persegnis Bastian was intercepted on September 28 at New York in Chionodoxa bulbs from Holland. Cercospora musae A. Zimm. was intercepted on banana leaves from Guatemala on December 1 at Boston and from Venezuela on December 6 at New York. Coniothyrium (oryzae Caf.)?, the spores being narrower than the description calls for, was intercepted in rice hulls from Puerto Rico on October 10 at New York. Coniothyrium sp. was found on Jacaranda seed from Mexico on September 12 at El Paso. Cylindrosporium castanicolum (Desm.) Berl. was intercepted on chestnut leaves in onion baskets from Italy on August 17 at New York. Diplodia coccarpa Sacc. var. malaccensis Tassi was intercepted on a coconut husk in mail from Tahiti on August 10 at Boston. Gloeosporium epidendri P. Henn. was found on Epidendrum radiatum entering under special permit from Guatemala at San Francisco on August 9. G. oncidii Cud. was found on plants of Oncidium superbiens from Colombia on October 21 at San Francisco. G. phormii (P. Henn.) Sacc. was intercepted at New York on October 5 on a

special permit plant of Phoridium colensoi from New Zealand. Helminthosporium curvulum Sacc. was found on one pepper in three crates from Cuba on December 19 at New York. Heterodera marioni (Cornu) Goodey was intercepted in Villandia sp. from Mexico on November 29 at San Francisco. Marsonia sp., no species reported on host, was intercepted at Roma on February 14, 1933, on Sophora secundiflora from Mexico. Orbilia myristicae P. Henn. was intercepted on a fruit of Myristica sp. in mail from Ceylon on September 19 at New York. Phaeocryptopus nudus (Pk.) Petr. was found on Abies balsamea in baggage from Nova Scotia on July 16 at Boston. Phaeoseptoria oryzae Miyaki was found on rice hulls from Puerto Rico on October 10 at New York. Pleospora ephedrae Speg., Sphaerella ephedrae Hollos, and Hendersonia sp. were found on Ephedra sinica in mail from Japan on September 23 at New York. Physalospora orchidearum P. Henn. was found on Oncidium superbium from Colombia on October 21 at San Francisco. Phyllosticta maculiformis Sacc. was intercepted on chestnut leaves in mail from Germany on December 7 at New York. Puccinia enaculata Schw. was intercepted on Panicum capillare used as packing around a willow tree from Canada on October 27 at Buffalo. Vernicularia phlogina Fairm. was intercepted at Buffalo on November 5 on Phlox subulata in a shipment entering via truck from Canada.

Trans-Pacific air express.--Shipments arriving at San Francisco show a steady upward trend, reaching a peak on October 19, when the Philippine Clipper arrived from Manila via Honolulu carrying 212 express packages, including 40 packages of plant material, of which 20 were consigned to points in California, the other 20 to points in other States. Owing to the high express rates for such material and the careful scrutiny given these shipments by the Territorial Plant Inspectors in Hawaii, very few infested shipments are being encountered.

Timber pests intercepted in materials for San Francisco World's Fair.--Building material for the Japanese exhibit at the Golden Gate International exposition, consisting of several thousand bundles of specially milled timber and logs--the latter with bark adhering--were found on inspection to be generally infested with a number of living forest insects, some of which are not known to occur in this country. The following beetles or their larvae were found in infested logs working in the cambium layers just beneath the bark: Ips japonicus Nijf. (adults), Orthotomicus sp. (adults), Cryptorhynchus sp. (larvae, pupae, and adults), Asemum sp. (larvae), Callidium rufipenne Motsch. (adult), and Dicerca sp. (larvae). Two queens of an undetermined termite were also found just under the bark. Specimens of a large weevil (Sipalus hypocrita Boh.) were found deep in the heartwood of fir logs and milled lumber and the larvae indicated an ability to destroy the merchantability of lumber from infested logs. Fumigation under rubberized gas-tight tents, using 4 ounces sodium cyanide (Na CN) per hundred cubic feet of space for 12 hours and later for 17 hours, proved inadequate as control measures, apparently owing to absorption of the gas by the excessive amount of moisture present. Subsequent treatment using methyl-bromide at the rate of 3 pounds per thousand cubic feet of space for a period of 48 hours under the same type of covering, a rubberized gas-tight tent, proved entirely adequate against all stages of the various insects intercepted insofar as it was possible to detect by inspection. Satisfactory disinfection was necessary as a condition of release, as all of the insects intercepted were in the adult stage, ready to emerge from the host, or in the pupal or advanced larval stages with every possibility

of completing their cycle during the period the host material would be in use at Treasure Island, and as the ultimate destination was immediately adjacent to Yerba Buena Island, on which there is an abundance of host pine. Tomeyuki Omeri, Secretary for the Japan Association for New York and San Francisco international expositions, was most cooperative in offering to comply with every safeguard recommended before any attempt was made to move the material.

DOMESTIC PLANT QUARANTINES

More about the grasshopper survey.--The 1938 fall survey of grasshopper eggs consisted of (1) a special survey by R. A. Roberts, in September and October, of the northern Great Plains area infested by Melanoplus mexicanus Sauss., and (2) part of the regular crop survey by district surveyors. Mr. Robert's method was to examine at least 10 1-square-foot samples of surface soil or sod and determine the average number of egg pods per square foot. Rangeland was divided into (1) adjacent-to-crops (within 1 mile) and (2) open range. There were 1,394 soil samples collected from 144 fields and range areas of the Great Plains and 1,558 fields and range areas were sampled by the regular supervisors.

Grasshopper bait needs for 1939.--The quantity of grasshopper bait estimated as needed in 1939 for control operations in 24 Western States, in the event that Federal funds are available for such baiting, is approximately 206,000 tons, as compared with 178,411 tons estimated for 1938. A general reduction in grasshopper population was effected in 1938, as stated in the January 1, 1939, News Letter. The increased need for 1939 is occasioned by the migrations last season of M. mexicanus in the northern Great Plains area, and of Dissosteira longipennis Thos. in the Panhandle area of Texas and New Mexico and in southeastern Colorado. Much more acreage of so-called idle land is also included in this year's calculations, the result of better surveys of this type of land as a source of infestation. This has been considered as a separate and additional item for bait estimates for North Dakota, South Dakota, Montana, and Wyoming.

Interior Department to control crickets on public range.--According to an item quoted from the New York Herald Tribune of December 9, in the Department's Daily Digest, the Interior Department has announced that it will supply the man power and equipment for a concerted drive next spring to rid the public range of the West of millions of forage-destroying crickets.

Mormon cricket damage studied.--A field study of the damage caused by Mormon crickets to cultivated and range plants was carried on during the crop season of 1938 by Ralph B. Swain, general supervisor, and "scattered" observations were made by cooperating supervisors of the infested States. Mr. Swain's observations were confined to areas in Nevada, Idaho, and Oregon. An attempt was made to determine the exact nature of the injury done to cultivated and range plants by estimating or measuring the loss in volume of the vegetative and reproductive parts. A list of all plants on which Mormon crickets were found feeding was compiled. Twenty-seven permanent plots of 0.1-acre each were established in cricket-infested areas, and representative plant species were individually staked and periodically examined for cricket injury. A method of measuring Mormon cricket injury to range, in terms of percentage loss in carrying capacity, was devised. Some of the

conclusions are: (1) The Mormon cricket is a general feeder. (2) There is a definite preference for certain food plants. In general, the more succulent the plant the more attractive it is. (3) There is a definite preference for particular parts of a food plant. The reproductive parts receive the greatest injury. (4) Injury is confined to actual eating of plant parts or to the killing of the foliage and flowers of certain shrubs by the girdling of the current year's twigs. (5) Feeding is never entirely stopped during migration. (6) Feeding is inhibited during certain hours of the day by mating or egg-laying activities. (7) Feeding slackens during the later stages of adult life when cannibalism becomes more frequent. (8) The nature of feeding is such that modifications of range-management methods may be used to measure Mormon cricket damage. In the present instance damage in terms of percentage loss in range-carrying capacity has been estimated. (9) On the basis of percentage-loss estimates in 0.1-acre plots, it is seen that Mormon cricket injury may range from slight to total destruction of carrying capacity for a single season. (10) By using large-scale sampling methods of the point-observation-plot type, together with estimates of carrying-capacity loss, it may be possible to determine accurately the degree of Mormon cricket injury to large areas of range land.

Progress in peach mosaic control.--The peach mosaic disease is now known to occur in 59 counties in 7 States. As a result of 1938 inspections, the disease was found in 1 county in Colorado, 4 counties in Texas, and 3 in Utah, not heretofore known to be infected. There was a decided reduction in 1938 in the incidence of the disease in California, New Mexico, Utah, and the El Paso Valley of Texas, according to the field project leader, A. E. Cavanagh. Furthermore, there were nearly 42,000 less infected trees in the entire mosaic area this year than in 1937--a 56-percent decrease. In 6 previously infected counties in 3 States no mosaic was found in 1938, and in 2 counties in 1 State, no mosaic has been found for 2 years. Very satisfactory results have been obtained in economic control of the mosaic disease in Colorado. Progress is being made in Arizona in the removal of diseased trees found in 1936 and 1937. Grower cooperation throughout the infected areas has improved because of the educational program carried on through county agents, 4-H Clubs, high-school agricultural classes, and other civic clubs. Emergency funds allotted to the Bureau have made possible the removal of diseased trees at the time of inspection and the eradication of millions of abandoned and escaped peach trees from the environs of nurseries and commercial orchards.

Lifting of phony peach quarantines from certain areas under consideration.--In accordance with the provisions of the standard State quarantines on account of the phony peach disease, it will be in order to release from regulation the States of Maryland and Oklahoma, as well as 5 counties in 3 other lightly infected States. No infections were found in the inspections this past season of 167 previously infected counties in 16 States. The outstanding accomplishments on this work may be attributed to a great extent to uniform action of the various States in revoking the ineffective quarantines issued prior to 1937 which were based on the practice of culling for the peach borer, formerly suspected of being the vector of the phony peach disease, and enacting in their stead regulations which require, as a basis of certification for shipment, the inspection of nursery environs and the removal of diseased trees therein by a specified date.

Federal quarantine action on account of white-fringed beetle.--Effective January 15, 1939, the Secretary of Agriculture issued a Federal quarantine (No. 72) on account of the white-fringed beetle infestations in 20 counties and parishes in Alabama, Florida, Louisiana, and Mississippi. The interstate movement of such materials as soil, compost, manure, and balled nursery stock, as well as potatoes and sweetpotatoes, is regulated throughout the year, whereas bare-rooted nursery stock and other plants, beans, peas, peanuts in shells, cotton, hay and other roughage, lumber and other unmanufactured wood, building materials, used machinery, junk, and similar articles are restricted during part of the year. "The larvae of the beetle feed on a wide variety of plant roots and tubers; while the adults feed on leaves and tender shoots close to the ground," Lee A. Strong stated, in referring to the quarantine action. "Adults may be carried to other points by any moving thing, eggs may be transported from place to place in the movement of almost any article coming in contact with the ground, and larvae may be moved with various kinds of soil, peat, compost, and manure. It is evident, therefore, that the cosmopolitan food habits of the pest, its diverse means of spread in any stage of development, together with its parthenogenetic mode of reproduction, characterize the white-fringed beetle as a potentially serious threat to American agricultural and horticultural interests."

White-fringed beetle adults found in December.--Thirteen live Naupactus leucoloma adults were found in December near Lake Ponchartrain, New Orleans, La., in well-protected spots somewhat warmer than other parts of the city. Three live beetles of Naupactus, new species, were found in Gulfport, Miss., as late as December 31, and were easily found at that point until December 15.

White-fringed beetle control activities.--Larval inspections for white-fringed beetle infestations were made in December at several infested points, including nursery areas in New Orleans and Baton Rouge. An increased number of larvae were found in New Orleans. In December 111 tons of sterilized soil was distributed to nurserymen by the Louisiana State Department of Agriculture. Nurserymen and florists of the New Orleans area are repotting plants in sterilized soil and cleaning up infested premises. The 13 inspectors assigned to that area in December made an effort to maintain 24-hour service for the inspection of holiday shipments by nurserymen and florists. Another regulatory district was established to include most of the produce shippers in the city. Over 14,000 permits were issued for the movement of nursery stock and other articles in the New Orleans area during the month. In the Florala, Ala., and Laurel and Gulfport, Miss., areas woodlands are being cleared of underbrush and on the more open localities and railroad rights-of-way vegetation is burned off in preparation for 1939 control activities.

Sweetpotato weevil control activities.--December 15 was set as the deadline date for cleaning up the sweetpotato fields in the weevil-infested counties of Alabama, Georgia, Mississippi, and Texas, in accordance with the provisions of the standard State quarantines, and this standard was reached in practically all instances. In Georgia, Mississippi, and Texas 223 fields have been replowed since harvest. Clean-up work and the eradication of wild host plants is also going forward in Alabama, with the assistance

of State-sponsored W. P. A. crews. The unusually heavy movement of sweet-potatoes during December necessitated increased activity in quarantine inspection and certification.

Inspection at the Christmas-shipping season.---The assistance of four inspectors from the Japanese beetle force, temporarily assigned to transit inspection in New York for the holiday shipping, made it possible to cover almost completely all incoming trains from New England points, as well as freight terminals, and to check the deliveries of nursery stock at the World's Fair grounds. Wholesale flower markets in New York City, where last year willful violations were found on the part of truckers bringing Christmas greens from New England, showed this season that the presence of an inspector had brought about greatly improved conditions as to quarantine compliance. Only 1 truck violation was found. Approximately 170 railway shipments moving in violation of quarantine regulations were intercepted at New York in December. Fifty-seven shipments containing Christmas gifts accompanied by evergreen twigs were inspected, certified, and allowed to proceed. The volume of mail handled at New York reached a new high, said to be the largest in the history of the Pennsylvania terminal, with an increase of $14\frac{1}{2}$ percent in storage-car-footage over 1937. Boston inspectors were assisted by 2 temporarily assigned inspectors from the Japanese beetle force, and 225 violations were reported from that station in December. Christmas trees, wreaths, and woody cuttings made up 65 percent of the violations at Boston and evergreen cones 17 percent. Mail shipments at Boston increased 500 percent over last year and express shipments 350 percent. The Pittsburgh inspector reported the inspection of 74 carload lots of Christmas trees originating principally in New England and Canada. Other decorative materials seen at that station were shipped principally from Delaware, Maryland, New Jersey, Pennsylvania, and North Carolina. Pine cones affixed to artificial wreaths originating with wholesale concerns in the gypsy moth area were found moving as violations at various stations.

"Hats - Don't Crush."---So read the label and waybill on a box of uncertified holly cuttings caught by the watchful eye of a Boston inspector.

Fewer Christmas trees shipped from New England.---The marked decline of New England trees in the Christmas-tree trade this past season was the subject of comment by transit inspectors at various points in the Midwest, Northeast, and South. The chief sources of Christmas trees passing through those inspection points were the Lake States, the Far West, and South.

Citrus canker eradication activities.---During December inspection for citrus canker was made cooperatively with the State on 447 properties in 4 Texas counties. Over 100,000 abandoned citrus trees were destroyed. Eighteen inspectors and 300 laborers, the latter on emergency relief rolls, were employed. No canker was found during the month. In the calendar year 1938 but 1 new case of citrus canker was found in Texas. There were 6 recurrent cases.

CONTROL INVESTIGATIONS

Rise of glycogen in the southern armyworm after glucose ingestion.--

Using the sandwich method, F. H. Babers, in the Beltsville, Md., laboratory fed glucose to mature sixth-instar larvae of the southern armyworm (Prodenia eridania Cram.). At varying time intervals the hemolymph and tissues were analyzed for glycogen content. After feeding approximately 12 mg of glucose, the tissue of glycogen began to rise within 30 minutes and rose to a peak in 7 hours at which time, as reported in an earlier news item, the blood glucose was back to normal. The tissue of glycogen then fell off sharply but remained considerably above normal for at least 24 hours, after which time no further analyses were made. No consistent rise in blood glycogen was obtained after feeding of only one sandwich but after much longer feeding on glucose, the blood glycogen rose to five-seven times its normal value. Most of the blood glycogen is concentrated in the cells and it is thought that perhaps the small amount found in the plasma may have been due to cell rupture during centrifugation.

Pentaerythrityl bromide patented.--William G. Rose and Herbert L. J. Haller (U. S. Patent 2,140,481) have patented, as an insecticide, pentaerythrityl bromide. In laboratory tests this was toxic to the cross-striped cabbage worm, the southern armyworm, the cabbage looper, and codling moth larvae.

Study of sodium arsenite begun.--Dusting with a mixture of one part by weight of powdered sodium arsenite and three parts by weight of diatomaceous earth is the standard measure employed by the Division of Domestic Plant Quarantines for control of the Mormon cricket in our Mountain States. The materials as now used are not entirely satisfactory and the Division of Insecticide Investigations has been called upon to take part in a study, in cooperation with the Division above mentioned and the Division of Cereal and Forage Insect Investigations, of the possibility of improving the mixture. The chemical nature of sodium arsenite will be studied in an effort to establish reasonable specifications for it; the particle-size distribution will also be studied with the idea of developing physical specifications defining a product most suitable as regards its behavior in the dust gun and its carry when blown out; and various easily obtainable diluents will be examined physically in an effort to determine the one best suited to the type of sodium arsenite finally selected.

New method of examining powdered insecticidal materials and diluents used with them.--As noted in previous issues of the News Letter, the Division is actively engaged in the study of the physical characteristics of dusting and spraying materials, of which it regards the state of subdivision as being perhaps the most important. Complete analyses of particle-size distribution have been made on some of the more important insecticidal materials, but the sedimentation method used, even with the improved apparatus developed in the Division, is time-consuming and not universally applicable. Recently there has come to our notice a method of estimating the specific surface of powders, by which is meant the total surface area of all the particles in a unit volume of substance. It is obvious that the specific surface is a function of the particle size and, although it has but a single value for any sample and hence cannot be equivalent to an analysis of the particle-size

distribution, yet we feel it may constitute a diagnostic characteristic upon which some idea may be formed of the suitability of insecticidal dusts and diluents. The method consists merely of measuring the drop in pressure when a current of air of known velocity is forced through a column of the compacted powder of known length, diameter, and weight. The aerodynamic formulas for reducing these observations to specific surface are known. A suitable apparatus has been constructed in the Division and is now in operation, and its operation has been found to be simplicity itself. So far only one sample has been examined, namely, the finest fraction of a particular calcium arsenate; the area found is more than that which we can calculate from the particle-size-distribution curve previously determined by sedimentation, which is as it should be because the latter contains no information concerning the 28 percent by weight of finest material in the sample. It is planned to use the method for the examination of all the common insecticides and powdered diluents.

BEE CULTURE

Package bee production per colony can be stepped up.--Warren Whitcomb, Jr., of the laboratory at Baton Rouge, La., writes: "During the spring of 1937 an experiment was started to determine the best methods of producing package bees. The results of a single season's work indicated that production could be increased enormously by regular heavy shakings and by supplying abundant honey and pollen at all times. It was felt, however, that even heavier shakings plus stimulatory feeding might produce still better results, and during the 1938 season such an experiment was started." In summarizing the results of this work for the past season, Mr. Whitcomb states "In general, it was again demonstrated that 30 pounds, rather than the 10-12 pounds obtained by commercial operators of bees, can be obtained from normal colonies by proper management. The maximum yield has probably not yet been reached and indications are that proper stimulatory feeding plus abundant pollen stores early in the season may increase the yield considerably."

Survey shows Wisconsin beekeepers losing honey through weak colonies.--C. L. Farrar, Madison, Wis., in analyzing data obtained from 17 Wisconsin beekeepers who possessed a total of 3,438 colonies, reports as follows: "The average crop for these beekeepers was 125 pounds and their crops ranged from 80 to 300 pounds per colony. Their maximum yielding colonies averaged 378 and ranged from 175 to 600 pounds. These records show that commercial beekeepers are obtaining average crops which equal only one-third of these maximum yields, indicating that they are failing to harvest the major part of their potential crop because their colonies are not in condition for the honey flow."

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NEWS LETTER

VOLUME VI 7083



UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

NEWS LETTER

FOR JANUARY 1938

Vol. VI, No. 3

(Not for publication)

March 1, 1939

ADMINISTRATION

The following paragraphs deal with the retirement of two employees that have given long service to the entomological work of the Department of Agriculture.

T. A. KELEHER

Thomas A. Keleher, who retired on November 30, 1938, from the Bureau of Entomology and Plant Quarantine, had been with the United States Department of Agriculture for nearly 55 years. He was born and educated in the District of Columbia and came into the Department as a 15-year-old messenger on January 2, 1884. His first duties with the Department were to feed and care for experimental lots of silkworms, to copy letters, and to care for insects which were being bred by the entomologists. In 1891 the silkworm rearings were discontinued and Mr. Keleher was assigned additional clerical duties. In 1902 Congress appropriated \$10,000 to study the possibility of silkworm culture in this country and Mr. Keleher was again connected with the work. The Department stopped its silkworm research in 1908. For the last 30 years of his service Mr. Keleher's work was the classification of the Bureau's correspondence.

R. S. CLIFTON

Richard S. Clifton, senior administrative assistant, Division of Japanese Beetle Control, was retired on January 31. Mr. Clifton's services with the Department have been continuous since his first appointment in November 1890. For many years he served as executive assistant to L. C. Howard, while the latter was chief of the Bureau. From about 1914 to 1919 he served as administrative assistant on gypsy moth control under A. F. Burgess at Melrose Highlands, Mass., following which he assumed charge of the eastern divisional European corn borer control office at Boston. After the revocation of the corn borer quarantine in July 1932, Mr. Clifton became administrative assistant to H. N. Bartley, in charge of the Boston district office supervising gypsy moth and Japanese beetle quarantine enforcement in New England. Mr. Clifton was active in the USDA Club of Boston. He resided at Hanover, Mass.

BENJAMIN FRANKLIN ON INSECTS

Perez Simmons, of the Fresno, Calif., laboratory of the Division of Fruit Insect Investigations, calls our attention to an interesting paragraph by Benjamin Franklin written June 11, 1760, in a letter to Miss Mary Stevenson, in Wanstead, Essex, while Franklin was in London. This was published in Carl Van Doren's "Benjamin Franklin" (845 pp., illus., 1938).

"Superficial minds are apt to despise those who make that part of the creation (insects) their study, as mere triflers; but certainly the world has been much obliged to them. Under the care and management of man, the labours of the little silkworm afford employment and subsistence to thousands of families and become an immense article of commerce. The bee, too, yields us its delicious honey, and its wax useful to a multitude of purposes. Another insect, it is said, produces the cochineal from whence we have our rich scarlet dye. The usefulness of the cantharides, or Spanish flies, in medicine is known to all, and thousands owe their lives to that knowledge. By human industry and observation other properties of other insects may possibly be hereafter discovered, and of equal utility. A thorough acquaintance with the nature of these little creatures may also enable mankind to prevent the increase of such as are noxious, or secure us against the mischiefs they occasion."

FRUIT INSECT INVESTIGATIONS

Control of peach borer with cages.--Oliver I. Snapp, of the Fort Valley, Ga., laboratory, reports that 105 peach trees in the laboratory experimental orchard were artificially infested with newly hatched peach borer larvae in 1937 and the base of each tree was kept caged during the moth emergence in 1938. There were 4,200 peach borers placed on the trees in 1937, or an average of 40 larvae per tree. A total of only 47 borers were found in all the trees during the winter of 1938-39. There were no borers in 77 of the 105 trees, although many empty cocoons and cast pupal skins were found around the trees under the cages at and below the ground line. The results indicate good control of the peach borer by the use of cages under experimental conditions, and indicate that commercial control could be expected in an isolated peach orchard, provided all of the trees were caged to prevent the escape of the moths that emerged from the trees that were borer infested.

Flight habits of *Laenophloeus* sp.--About 9,700 small beetles of this genus, which are found in stored raisins, were taken in a rotary net during 6½ months of operation in a raisin-storage yard in Fresno, Calif. The catches, recorded by Dwight F. Barnes and George H. Kaloostian, of the Fresno laboratory, increased from zero in April to 3,229 in July and declined to 155 in October. As shown by the following condensed record of catches removed from the net at 15-minute intervals on July 14, the main flight of *Laenophloeus* occurs at about sunset and a secondary flush of flight takes place in the early part of the morning. On July 14 sunrise was at 4:50 and sunset at 7:19.

Time	Beetles	Time	Beetles
:	taken	:	taken
<u>a.m.</u>	<u>Number</u>	<u>p.m.</u>	<u>Number</u>
5:30-6:00----	3	2:00-3:00----	1
6:00-7:00----	8	3:00-4:00----	3
7:00-8:00----	14	4:00-5:00----	1
8:00-9:00----	5	5:00-6:00----	3
9:00-10:00----	3	6:00-7:00----	77
10:00-11:00----	1	7:00-7:45----	404
<u>p.m.</u>		7:45-8:15----	22
1:00-2:00----	1	::	

MEXICAN FRUITFLY CONTROL

Fruitfly catches in January.--Traps were operated on approximately 500 premises in the Rio Grande Valley in January and adults of Anastrepha ludens Loew were found on 112 of them. Of the 154 flies taken, 70 were females, 38 percent of which were gravid. Although no larvae have ever been found in January, immense quantities of fallen fruit were examined in the field this last month. Inspectors estimate that 40 percent of the fruit has been harvested. Shipments to date total 15,475.7 equivalent carlots, which is 4,055.9 equivalent carlots more than was shipped to the same date last season. Extension of the harvesting season to June 15 for Valencia oranges was announced on January 27. This modification in no way affects the close of the harvesting season for grapefruit, which is now set at April 30.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Spring wheat resistant to hessian fly.--Elmer T. Jones, Manhattan, Kans., reports that of a series of 604 varieties and selections of spring wheats, fall tested for resistance to hessian fly in the Springfield, Mo., test plots, only 7 were found to be resistant to infestation. The resistant strains, with infestations ranging from 0 to 4 percent, were: Centenario Portugal F.P.I. 116311, T. vulgare F.P.I. Nos. 124367 and 125390, T. pyramidele recognitum F.P.I. Nos. 113397 and 113398, and T. timopheevi F.P.I. 94761. Infestations of other strains in the test ranged from 22 to 100 percent of the plants infested. The average infestation of Ceres, susceptible, checks was 97 percent. The average infestations of the resistant checks Marquillo and Illinois No. 1 W 38 were 1.5 and 0 percent, respectively.

Hessian fly ecology study terminated.--The study of the effect of moisture and other ecological factors on hessian fly abundance, conducted by J. R. Horton at Wichita, Kans., has now reached the stage where its continuation is not considered warranted, in view of other more urgently needed work. This study is therefore being terminated and Mr. Horton is being assigned to ecological studies of grasshoppers in the southern Plains States, his headquarters remaining at Wichita.

Amazon flies recovered in Louisiana sugarcane fields.--A total of 1,222 Amazon flies, Metagonistylum minense Towns., were bred and released in 11 fields in Louisiana and in 3 fields in Florida in 1938 to control the sugarcane borer. T. E. Holloway and W. E. Haley, of the Houma, La., laboratory, recovered these parasites in 6 of the 7 release fields in Louisiana in which recovery examinations were made. On Southdown Plantation, near Houma, 52.3 percent of the borer stages were parasitized in 100 infested stalks of cane in October in a field where 145 flies were released mainly during July. Percentages of parasitization in the other 5 fields were 8.4, 13.7, 22.1, 44.6, and 50.0.

Borer infestation in variety test fields.--Commercial and promising varieties of sugarcane being grown in variety test fields were examined for sugarcane borer infestation during November and December by J. W. Ingram, W. E. Haley, and others of the Houma, La., laboratory. These test fields are conducted by the Sugar Plants Division of the Bureau of Plant Industry. The percentages of joints bored were determined for 20 stalks in each of 5 replicates of each variety in each of 5 plant-cane test fields and in 5 first-year stubble-cane test fields. Results of these examinations in average percentages of joints infested and the low level of significance of the varietal differences, as determined by the analysis of variance method, follow:

Test	: C.P. :	Co. :	C.P. :	C.P. :	C.P. :	C.P. :	C.P. :	C.P. :	Co. :	C.P.
field	:29/116:	281	:29/137:	29/320:	31/509:	32/202:	28/11:	28/19:	290	:29/120
Plant----	: 35.5 :	30.6 :	30.0 :	29.4 :	25.8 :	24.9 :	24.8 :	24.2 :	20.8 :	--
Stubble--:	31.9 :	25.1 :	-- :	22.9 :	-- :	-- :	23.4 :	20.0 :	17.6 :	11.4

Low level of significance for varietal differences: Plant cane, 5.4 percent; stubble, 5.6 percent.

JAPANESE BEETLE CONTROL

Reduction in Christmas-tree inspections.--There was a reduction of 55 percent in the number of Christmas trees inspected in 1938, as compared with the 1937 season. During the past November and December, 343,398 trees were inspected and certified for shipment from the lightly infested gypsy moth area. The situation is explained in part by the removal from the lightly infested gypsy moth regulated area of 26 towns in New Hampshire and Vermont. The area from which trees might be shipped under certification was also decreased by the transfer of 54 towns in Maine, New Hampshire, and Vermont from a lightly infested to a heavily infested status, automatically embargoing the movement of trees from these 54 towns. All trees inspected in 1938 were found free from gypsy moth egg masses.

Special handling of logs from hurricane area.--The first carload of logs to be cut in the New Hampshire hurricane area was inspected and certified at Conway, N. H., for shipment by the New Hampshire Timber Salvage Administration to the Forest Service laboratory at Madison, Wis. When the shipping order was received the logs were in the woods, covered with ice and snow. To permit immediate inspection, the logs were assembled at a shipping point where the ice and snow were satisfactorily removed by steam from an upright boiler such as is used by highway departments in thawing frozen culverts and manholes.

Fourteen gypsy moth egg clusters were discovered, creosoted, and removed from the 8,000 board feet of three grades of pine logs included in the shipment.

Hurricane shortens crop of evergreen boughs.--Spruce boughs inspected and certified for shipment to points outside the gypsy moth regulated areas amounted to 746 tons (14,922 bales), or a 45-percent reduction from the quantity certified in 1937. The decrease of 600 tons is partially due to the hurricane of September 21, which left spruce-bough lots in western Massachusetts and southern Vermont in poor condition. The baled boughs were certified for shipment on the basis of inspections of cutting lots in 91 localities. Nine egg clusters were found on 6 lots in Vermont and 1 lot in Massachusetts. Boughs were not inspected if shipped from lots near which egg clusters were found. Six hundred acres of bough lots in Massachusetts and 2,300 acres in Vermont were scouted in connection with the marketing of this crop.

Gypsy moth permits of three nurseries revoked.--Finding of gypsy moth infestation in the vicinity of three large nurseries in the Manchester, Conn., district resulted in the cancelation of permits under which these establishments had been permitted free movement from the regulated area of all their stock.

Infested articles inspected.--Among the consignments of quarantined products inspected during the month were 11 lots from which 111 gypsy moth egg clusters were removed. Twenty-two egg clusters were removed from 3 cords of birch fireplace logs. Twenty-one egg masses were found on 2 carloads of lumber inspected at Deering Junction, Maine, for shipment to North Tonawanda, N. Y. Other infested shipments comprised lumber, birch-bark novelties, logs, and exhibit material.

Material inspected for nature exhibit.--Gypsy moth inspectors in the Portland, Maine, district examined 3 tons of rocks, cut hardwood trees, and poplar trees for shipment from Readfield, Maine, to the Boston "Sportsmen's Show." Thirty-three egg clusters were found on these articles. After the Boston show the entire exhibit will be transferred to New York City.

Methyl bromide experiments continued with promising results.--Trials with methyl bromide as a fumigant for potted plants have attracted considerable attention among nurserymen and greenhousemen. This work is performed in cooperation with the Division of Control Investigations. These trials are unlike the usual run of laboratory tests in that the fumigation is done at commercial establishments with plants furnished by the growers. The plants are then replaced in the greenhouses and handled in the usual manner. The growers are thus able to judge the results of the tests without awaiting accumulation of laboratory data. Many of the nurserymen present at the annual meeting of the New Jersey Association of Nurserymen held in Trenton during January spoke very favorably of the methyl bromide treatment.

New business contacted.--During the month an inspector from the New Cumberland, Pa., field office made a preliminary examination of an establishment set up in woodland area near Harrisburg for the purpose of gathering natural woodland plants and moss to be made up into glass gardens. The package is made up and covered with cellophane for disposal through one of the 5- and 10-cent chain stores in the East and Middle West. Arrangements were made

for the certification of the plants, moss, and small quantity of sand placed in each package. All materials used are collected in the vicinity of the packing shed. Most of the shipments are to be made within the Japanese beetle regulated area, but some large orders are booked for the West so that considerable certification will be required until Easter.

Philadelphia office moved.--On December 29 the Division was compelled to relinquish space occupied by the Philadelphia district office in the Frankford Arsenal. Temporary quarters were located at the Moorestown, N. J., research laboratory. This arrangement was continued until February 1, when they were moved to 6905 Torresdale Avenue, Philadelphia. The new telephone number is Mayfair 1221.

Autogiro activities.--Aerial scouting is still in progress in the Stokes State Forest area in New Jersey and the Pine Plains and Stony Point areas in New York. These are the three areas selected for surveys to determine the cost of elm elimination in mountainous sections. The aerial timber damage survey conducted for the New Hampshire Fire Hazard Reduction and Timber Survey Commission was completed on January 11. The following day the personnel manning autogiro NC-2740 returned to the Department's airport at Preakness, N. J. Officials in charge of the work estimated that the aerial survey was accomplished 837 times faster than would have been possible with timber-cruising crews.

Elm-sanitation activities in West Virginia and Maryland.--Poor road conditions in that section of West Virginia near Wiley Ford have made it difficult for the Cumberland, Md.-Wiley Ford, W. Va., crews to reach their work sites quickly and safely. Accordingly, a rowboat was furnished for use in getting to work sites that ordinarily would be reached by hazardous mountain roads. Throughout the sanitation area which follows the Potomac River between Pinto, Md., and Spring Gap, Md., elm logs have been allowed to remain at reasonable intervals for the purpose of trapping Hylurgopinus rufipes (Eich.) present in the area. Trap logs will also be placed east of Spring Gap and west of Pinto for distances of 8 miles in either direction.

Indianapolis confirmations.--Two cases of the Dutch elm disease were confirmed in Indiana during the month. Both trees were located near Crown Hill Cemetery, in Indianapolis. One of the trees was located 4 feet north of a previously diseased tree. The second confirmation was found 4 feet west of the initial confirmation at this point. In the course of selective sanitation, both of these trees were top and trunk sampled and discoloration was observed, although they appeared to be of high vitality. Each tree measured 13 inches DBH. They were both removed when the specimens were taken for culture.

Dutch elm disease eradication in Pennsylvania.--Contact workers in Upper Makefield Township, Bucks County, Pa., have obtained permission for elm-sanitation work on 1,000 acres, representing about 5,620 dead or devitalized elms. Five Pennsylvania crews are at work on 2 large islands in the Delaware River where elms are in extremely poor condition, owing to injury by ice and storms. Much beetle wood has been noted and many beetles have been found in all stages of development.

Athens, Ohio, clean-up.---Considerable work was necessitated by the Athens crew in cleaning up brush and elm debris left by line-clearance crews and residents of the town. Many home owners had their elms dehorned and the sawed-off branches were generally left on the property. This initial clean-up of the town has been completed.

FOREST INSECT INVESTIGATIONS

Winter kill among Black Hills beetle larvae.---J. A. Beal, of the Fort Collins, Colo., laboratory, reports that during a sudden drop in temperature to -5° F. on November 6, 1938, considerable mortality occurred among the overwintering larvae of Dendroctonus ponderosae Hopk. on the Pike National Forest, in central Colorado. Apparently because of the mild fall weather preceding the freeze, the larvae had not progressed very far in the winter-hardening process. Mortality varied according to the bark thickness of the host. In general, very thin bark--1/4 inch and less in thickness--showed high mortality, ranging from 50 to 100 percent. Under bark from 1/4 to 1/2 inch in thickness mortality averaged about 50 percent. In bark between 1/2 and 3/4 inches thick mortality averaged less than 25 percent, with little or no mortality under thicker bark. Total mortality averaged slightly less than 30 percent. About the only advantage of the freeze as affecting present control work is the fact that infested limbs will no longer need to be treated.

Evidence of second brood of pandora moth in Colorado.---According to N. D. Wygant, recent evidence obtained at the Fort Collins, Colo., laboratory indicates that there may be 2 broods of the pandora moth in the infestation on the Arapaho National Forest. Ordinarily there is only 1 brood of the pandora moth in an infestation, the moths emerging every 2 years and the larvae causing heavy defoliation every other year, or during the second year of feeding. There was a heavy flight of moths in the infestation during 1938, the brood of which are now overwintering on the trees in the second and third larval instars. Ranger D. C. Johnson sent to the Fort Collins laboratory some pupae for rearing which he collected in one area during the fall of 1938 where there were 8 to 10 pupae per square foot, and these appear to represent a second brood. During the winter several moths have emerged from these pupae. There should, therefore, be an emergence of second-brood moths in certain areas during 1939, contrary to past history of the insect. This will mean that there may be 2 broods of the insect present in the infestation in the future and that heavy defoliation may occur every year instead of every 2 years.

Pine-beetle-survey data summarized.---The field work of surveying 11,000,000 acres of ponderosa pine forests in Oregon and Washington was completed in October, according to F. P. Keen, of the Portland, Oreg., forest-insect laboratory. Reports have been prepared and issued covering all of the pine forests in Washington and two important areas in Oregon. Remaining reports on Oregon areas will be issued as rapidly as compilations are completed.

Godfather to a springtail.---A new species of Collembola, Arrhopalites whitesidei Jacot, was collected in 1937 by J. M. Whiteside, of the Portland, Oreg., laboratory, while it was depopulating a formicary of the mound-building ant Formica exsectoides Forel near Branford, Conn.

Mountain pine beetle parasites decrease.---As a result of detailed bark analysis of western white pine trees infested with the mountain pine beetle, W. D. Bedard, of the Coeur d'Alene, Idaho, laboratory, reports that beneficial insects attacking this beetle have decreased in abundance during the last 2 years within the 2 areas studied on the Coeur d'Alene National Forest. In 1936 parasites and predators of the mountain pine beetle averaged 7.1 per square foot of infested bark. In 1937 they had decreased to 4.9 per square foot, and in 1938 an additional decrease brought the average to 2.5 per square foot. This mortality among beneficials was not constant for each species, however, and appeared to be greatest among insects that pupate within definite pupal cases. Among the parasites, 2 small chalcids increased in 1937 and 1938, while Coeloides dendroctoni Cush. alone showed a decrease. Among the predators, Phaonia pudoa Hall suffered such a severe mortality that not a single larva was found in 1938, while Lonchaea viridana Meig. decreased from 1.08 per square foot in 1936 to 0.01 per square foot in 1938. Three other predators changed but slightly in abundance during the 3 seasons.

Dutch elm disease in Europe discussed at meeting.---At a meeting held at the Dutch elm disease laboratory at Morristown, N. J., on February 2, J. M. Walter, of the Bureau of Plant Industry, and D. E. Parker, of this Bureau, discussed the Dutch elm disease and the insect vectors of the causative fungus from a European standpoint. Messrs. Walter and Parker returned to Morristown last fall after having spent over 3 years in studying the disease and its vectors in Europe. With their headquarters at Oxford, England, they traveled in Holland, Belgium, France, Germany, Czechoslovakia, and Italy. Their talks were illustrated with slides and were based on observations that they made in these countries and on information they obtained from those who have studied the disease there. The meeting was attended by about 30 persons. These included members of the Bureau of Plant Industry and the Bureau of Entomology and Plant Quarantine stationed at Morristown, N. J., members of the Bureau of Entomology and Plant Quarantine who are engaged in Dutch elm disease eradication and stationed at Bloomfield, N. J., members of the New Jersey Department of Agriculture, and members of the Cornell University Agricultural Experiment Station who are engaged in research work on the Dutch elm disease at Boyce Thompson Institute, Yonkers, N. Y.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Old unhatched egg cluster found in Vermont barrier zone area.---While scouting by the 1/4-mile strip method early in January, a scouting crew located a gypsy moth egg cluster in the town of Hancock, Addison County, Vt. The cluster was creosoted and forwarded to the gypsy moth office to determine whether or not it was fertile. Apparently this cluster was deposited during the summer of 1937 and, although fertile, it failed to hatch last spring. Living infestations have previously been found in the adjoining towns of Goshen, Granville, and Ripton. Evidently these infestations became established by windspread from infested areas east of the barrier zone.

Five small infestations found in barrier zone section of Vermont.---A single-egg-cluster gypsy moth colony was found in Granville, Vt., during the week of January 9-14. This makes a total of 5 single-egg-cluster infestations discovered in this town during the present fiscal year. Granville is located just within the barrier zone in the central part of Vermont.

Infestations found in town bordering the barrier zone.--An employee of the Bureau of Entomology and Plant Quarantine, engaged in bough-lot-inspection work, discovered a single gypsy moth egg cluster in the town of Plainfield, Mass., about the middle of December. As Plainfield borders the barrier zone, it was decided to modify the plan of scouting and treatment work east of the zone so that a small force of W. P. A. workers could be temporarily assigned to that town to determine whether or not additional infestations existed in the locality. Work was begun on December 19, 1938, and 1,886 acres of woodland and open country had been scouted up to January 7. Six infestations, totaling 20 egg clusters, were found in the area. Because of the discovery of these infestations, work will be continued in Plainfield for an indefinite period.

Small infestation endangers barrier zone in southern Massachusetts.--A small gypsy moth infestation was recently located in the township of Tolland, Mass., which borders the barrier zone town of Sandisfield on the east and is just north of the Connecticut State line. The infestation is situated on a high elevation and is favorably located for windspread into a very rugged and heavily wooded section of the barrier zone. Intensive control measures will be adopted to eradicate this important colony.

No gypsy moth infestations found in New Jersey by State employees.--A report from the State of New Jersey employee directing gypsy moth activities in that State indicates that the small force of State employees assigned to duty under his direction spent a large amount of time in examining the heavily wooded areas along the New York State line south of the Shawangunk, N. Y., infestation. They have also performed a limited amount of work in a swampy area in the region of South Brunswick, near sites of infestations found there several years ago. No evidence of the gypsy moth has been found in New Jersey to date.

Progress made in burning accumulated brush.--Unskilled laborers in the Pennsylvania area have made good progress in disposing of forest debris that accumulated as a result of ground work and selective thinning of favored food species done in that section by gypsy moth crews. During the last week in January, 19 of these men burned 700 piles of brush which averaged more than a cord to each pile. As a result of this work, 44 acres of woodland were put into satisfactory condition preparatory to scouting, burlapping, and spraying.

Extreme precautions used in scouting powder-company property.--Gypsy moth scouting work was begun during the first part of January on the grounds of the Dupont Powder Company, located in Pittston Township, Pa. The company officials required each employee of this project to wear rubber shoes and to submit to a search for matches, cigarettes, and other inflammable articles before entering the gates of the property. A guard, furnished by the company, remains with the crew at all times while scouting is in progress.

Beaver dam floods woodland area.--Gypsy moth workers engaged in scouting a large woodland area in Lackawanna Township, Lackawanna County, Pa., report that beavers have dammed up a stream in one section of the woodland. This caused a swampy area of considerable size to become flooded to such an extent that the territory could not be scouted until the ice froze sufficiently to bear the weight of the workers.

C. C. C. work in Connecticut concentrated in large, heavily infested area.--Practically all of the C. C. C. gypsy moth work done in Connecticut in January was performed in the dense and extensive infestation in the Granby-Simsbury region. Creosoting of egg clusters on tree trunks up to a height of 5 or 6 feet has been done throughout this area, approximately 350 acres of woodland have been selectively thinned, and much of the accumulated brush and forest debris has been burned. To the end of January, approximately 2,909,000 gypsy moth egg clusters had been creosoted or destroyed by burning. The work from now until hatching time will consist principally of going over the area again and creosoting egg clusters that can be reached from the ground with poles, and climbing many of the most heavily infested trees and creosoting the higher situated egg clusters. By this method, the greatest possible number of egg clusters will be destroyed before spring.

Forest-fire-reduction work may prevent C. C. C. gypsy moth work requested by State of Vermont.--The State of Vermont has requested the preparation of a plan for C. C. C. gypsy moth work, to be supervised by this Bureau, for the 13th and 14th enrollment periods, which extend from April 1, 1939, through March 31, 1940. Plans of work, based on the numbers of men available at the time of the flood and hurricane of September 21, 1938, have been submitted, but it appears that practically all of the men in camps in which gypsy moth work has been performed under the supervision of this Bureau will be needed on forest-fire-reduction work for a considerable period, and it may be impossible to grant the request at the present time.

PLANT DISEASE CONTROL

Minimum age of common barberry bushes at time of first fruiting.^{1/}--In the summer of 1930 many seeds of common barberry were sown in experimental plots near Maumee, Lucas County, Ohio, to extend our knowledge of the effect of various environmental conditions on the germination of common barberry seeds and the survival of the resultant seedlings. An accurate record was kept of the seedlings appearing and surviving each year until the end of 1936, when the experiment was closed. Although these seedlings were 5 years old, none of them had flowered or fruited. Since there were many seedlings in definitely located plots, this was considered an ideal opportunity to study the minimum age of fruiting in common barberry seedlings. All bushes were approximately the same age and some of them had reached a height of about 2 feet. Ten seedling bushes were left in each of five plots and one in another plot. These were inspected in the summer of 1937 and again in 1938 and notes were taken on the size, number, and condition of the bushes. The plants in all of the plots appeared healthy and in good condition and all displayed a satisfactory length of new growth. The results of the observations are recorded in the accompanying table. A study of this table shows that the plants in most cases were larger in 1938 than in 1937. The size of the plants is best described in terms of length, rather than height. Although all of the plants grew during the spring of 1938, not all show an increase in height, because new growth is not always an extension of the last year's growth, but

^{1/}Dr. W. G. Stover, of the Botany Department, Ohio State University, recorded and compiled these data.

often arises from a lateral bud lower down on the stem. No evidence of flowering or fruiting could be found in any of the plots. The bushes are now 7 years old and no berries have been found on them at any time. It is possible, however, that the droughts of the last few years have delayed fruiting of these plants. The following table shows the conditions in the "Age of fruiting" plots near Maumee, Ohio, in 1938.

Type of plot	:Plot: Number of bushes, :				Condition:	Maximum length:		Bushes
	num-:	by years			of	of plants		:fruiting
	ber :	1936:	1937:	1938:	plants :	1937 :	1938 :	:
	:	:	:	:	:	Inches	Inches	Number
Well-drained soil, partial shade-----	: 1	: 10	: 10	: 10	: Good	: 29	: 48	: None
Well-drained soil, full shade-----	: 2	: 10	: 8	: 7	: Good	: 13	: 22	: None
Well-drained soil, full shade-----	: 3	: 10	: 10	: 10	: Good	: 14	: 20	: None
Poorly drained soil, full sun-----	: 4	: 1	: 1	: 1	: Good	: 36	: 36	: None
Well-drained soil, partial shade-----	: 5	: 10	: 10	: 10	: Good	: 24	: 26	: None
Well-drained soil, partial shade-----	: 6	: 10	: 10	: 10	: Good	: 32	: 48	: None
Total-----	: --	: 51	: 49	: 48	: --	: --	: --	: --

Blister rust kills pine rapidly in unprotected sections of western Washington.--Western white pine stands in the Douglas fir region of western Washington, while rather numerous, are not, in most cases, of sufficient acreage and value to justify the cost of protection, and practically no Ribes eradication has been carried out in this area, except in the Mount Rainier National Park. Members of the staff of the Spokane blister rust control office visited that section in the fall of 1938 to observe the spread of blister rust under unprotected conditions. Four of the older infection centers in the West were inspected during the trip. Three of the four areas, Pysht, Joyce, and Paschall's Ranch, are on the Olympic Peninsula in localities bordering either Puget Sound or the Strait of Juan de Fuca. The rust is believed to have invaded this region at least as early as 1918. The fourth area, Spirit Lake, is in southwestern Washington on the slope of Mt. St. Helens in the Cascade range. A report on the Pysht area was given in last month's News Letter (p. 10). The Joyce area, which is about 15 miles west of Port Angeles, supports scattered, open-grown white pine, Douglas fir, and cedar. Although no detailed account of infection development in this locality is available, the first known infection, discovered by Godding and Petty in 1926 was one small canker on 1923 wood. In 1938, after 12 years of intensification from Ribes bracteosum, R. divaricatum, R. sanjuneum and R. lobbii, about half of the 20- to 30-year-old pines are dead and the remainder will die within a few years. Although there is evidence that cone production on these trees has been quite heavy in recent years, not one white pine seedling or small tree was found. Paschall's Ranch, located 6 miles west of Bremerton, is situated in a small valley opening with a fine stand of white pine, Douglas fir, and hemlock. The center of heavy pine infection around this ranch was located in 1927 through a quarantine inspector's interception of 2 healthy P. monticola in a shipment of evergreens

from the ranch owner. Correspondence on this prompted the owner to follow up by sending specimens of the disease from other trees on his property. The first examination of the pines included 50 trees around the ranch, all of which were infected, with an estimated average of 20 cankers per tree. Probably of 1920 origin, this center was built up by R. bracteosum, R. sangiuneum and R. lacustre. By 1938, every one of the pines immediately adjacent to the ranch had been killed. In the uplands where Ribes are extremely scarce very little infection was noted. Although no careful check of upland infection was made in 1938, it appeared to have increased very little over the 2 percent reported in 1927. The original Spirit Lake infection center covered an acre of abandoned homestead clearing 4 miles west of the Lake and about 2 miles below timberline at an elevation of 2,700 feet. Introduction of the rust into this attractive recreational area occurred about 1920 through the medium of R. laxiflorum, R. bracteosum, and R. lacustre. The center was found in 1927 at which time only 14 pines had visible infection. An abundance of Ribes associated with an excellent stand of white pine above the infection center made it evident 11 years ago that rust spread would be rapid in this area. In 1938 it was observed that every white pine around the original center has been killed and that rust spread has even reached the last stunted western white pines and whitebark pines at timberline, at least 10 miles away. Of note in connection with this infection center is the abundance of pole and mature white pine that is being killed by bark beetles. It is evident that blister rust and beetle damage are closely associated but the extent to which weakening of the trees by the parasite is encouraging insect invasion was not evident. It is notable, though, that the combined forces of blister rust and beetles will in time completely remove white pines as the principal tree from extensive areas around Mount Saint Helen.

Spread of white pine blister rust in 1938, summary.---During the calendar year 1938, blister rust was found for the first time on either white pine or Ribes in 70 counties. Six of these counties are in the Southern Appalachian States, 60 in the North Central States, 2 in Montana, and 2 in California. The southern limits of the known infected region in the North Central States was extended from 1 to 3 counties in Ohio, Indiana, Illinois, and Iowa. In this region infection in 38 of the 55 counties occurred on the cultivated black currant (R. nigrum). The large number of counties in which the disease was found on this species shows its importance as a disseminator of the rust and the need for eradication in regions where white pines are valuable forest trees. The disease was found for the first time at 5 different points where inspections were made in Glacier National Park. This represents an eastward extension of the rust in Montana into Flathead and Glacier Counties. In California the rust was found to have spread southward another 35 miles during 1938 and is now present about 160 miles below the Oregon-California border.

Blister rust aecia found in January.---R. E. Wheeler reports finding "active" aecia on white pine in the town of Chesterfield, Mass., on January 13.

COTTON INSECT INVESTIGATIONS

Insecticides, with and without wetting agents, for boll weevil.--During 1938 four experiments were conducted by C. T. Rainwater near Florence, S. C., in an effort to find a substitute that would control the boll weevil and at the same time overcome objections to the use of calcium arsenate. Each experiment consisted of six treatments replicated six times on 1/20-acre plots arranged in a Latin square. The insecticides used were calcium arsenate, which was used in all four experiments for comparison with the others, nicotine bentonite, nicotine bentonite plus nicotine tannate, a fine synthetic cryolite, containing 90.8 percent Na_3AlF_6 and a coarse cryolite containing 78.3 percent Na_3AlF_6 . All the insecticides were applied as dusts with and without one or more of the following wetting agents and stickers: Vatsol, Areskep, Aresket, Lethane, and a dry gum containing a tapioca base. The first four were mixed with the insecticides at the rate of 1 percent by weight, and the gum at 5 percent by weight. A mixture of equal parts of calcium arsenate and calcium carbonate without a sticker or spreader was also used. Aphid infestations developed on the calcium arsenate plots and caused considerable shedding of leaves and fruit, whereas very little infestation developed on the nicotine plots. The plots dusted with fine cryolite developed heavy aphid infestations and the coarse cryolite plots medium aphid infestations. Statistical studies of the data showed that none of the wetting agents and stickers increased the effectiveness of the calcium arsenate or the nicotine compounds. A synthetic liquid sticker and spread (Lethane) did increase the effectiveness of the fine cryolite and made it comparable to calcium arsenate. Calcium arsenate, used alone or in combination with stickers and spreaders, and the fine cryolite were superior to the nicotine compounds, with or without stickers and spreaders. The nicotine compounds gave very little, if any, control. No significant differences occurred between calcium arsenate and the calcium arsenate-calcium carbonate mixture. From these studies and from general observations made throughout the season, it appears that cryolite might be developed into a satisfactory substitute for calcium arsenate in boll weevil control, provided that its dusting qualities are good and that the percentage of sodium fluoaluminate is high.

Survival of pink bollworm larvae in water.--Two floods from the Rio Grande, which occurred in the Big Bend area of Texas in September and October 1932, covered some 4,500 acres of cotton and carried large quantities of cotton out of the valley. The recent floods in July and September 1938 again provided a possibility of material infested with pink bollworm being carried out of the valley by flood waters. Tests to obtain information as to how long pink bollworm larvae can survive in water were conducted by S. L. Calhoun, of the Presidio, Tex., laboratory. Green and open cotton bolls, heavily infested with pink bollworm, were placed in containers and weighted down so they were continuously submerged in water, and in other tests were left to float free. Approximately 50 percent of the larvae in submerged green bolls were alive after 6 days. Some were alive through the 9th day, but all were dead on the 10th day. Some of the green bolls remained afloat, and 16 percent of the larvae were alive on the 16th day when the last sample was examined. Approximately 25 percent of the larvae were still alive in floating, open bolls on the 12th day when the last sample was examined, and it is probable that much longer survival would have been recorded had sufficient bolls been available for continued examinations. In submerged open bolls about 4.5

percent of the larvae were alive on the 12th day. Other investigations in Mexico have shown that a few larvae survived for 64 days in open bolls buried in the soil and completely covered with water. It is estimated that flood waters of the Rio Grande would travel from Presidio to the Gulf of Mexico in about 13 days. With records of cotton bolls remaining afloat and larvae surviving for at least 16 days, there is a possibility of infested material being carried from the Big Bend to the lower Rio Grande Valley. Inspections were made for cotton along the river bank during and following the 1932 floods, but none was found outside the Big Bend area. However, the fact that larvae can survive in bolls in water for sufficient time to be carried to the Gulf, and the discovery of pink bollworm infestation in the lower valley 4 years after the 1932 flood, present an interesting series of circumstances for speculation.

Pink bollworm hibernation studies.--Studies were conducted by H. S. Covitt and O. T. Robertson to determine the percentage of larvae going into the long-cycle stage at various periods in the fall. Beginning the first of September, 100 larvae that had recently issued from green bolls were installed daily in each of 2 cages through September 15. Similar daily installations were made in other cages during the periods September 16-30 and October 1-15. A total of 9,000 larvae were installed during the period of the test. The cages were examined on November 30 to determine the number of long-cycle larvae surviving in each installation period. The results of these examinations are recorded below.

Date installed :	Larvae : : recovered :	Total larvae installed
:	Number :	Percent
September 1-15---	9 :	0.33
September 16-30--:	209 :	6.96
October 1-15-----:	602 :	20.03

As shown above, there was an increase in the percentage of larvae going into the long-cycle stage as the season advanced. Owing to floods and cleaning, it was impossible to continue the tests after October 15; however, the results indicate that an early maturity of the crop followed by an early fall field clean-up would reduce the larval population going into hibernation in the soil.

Field clean-up-machinery investigations.--A shaver-type stalk cutter, mounted on the frame of a two-wheeled cart duster was constructed and tested by W. T. Hunt, for use in field clean-up to reduce the overwintering pink bollworm population. The wheels of the cart were adjusted so as to straddle two rows. Two serrated cutting blades were attached to an extension of the frame about 3 inches above the ground on the inside of the wheels. The blades sloped back at an angle of about 40°, so that they would shed the stalks after cutting them. In operation the cutter straddled two rows of cotton, cutting the straddled rows and windrowing the cut stalks in the center. Although the machine left a few stalks that were not cut, it was considerably faster than hand methods. Ordinarily one man can cut about 3/4 of an acre with a machete or hoe, as compared to 8 or 12 acres with the machine.

Observations indicate that there was very little, if any more shattering of bolls and squares where the cart machine was used than where the stalks were cut by hand. This cart-type cutter was easier to handle, lighter in draft, and left fewer standing stalks than the sled-type cutter formerly used.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Pink bollworm eradication in the Salt River Valley.--The field clean-up campaign in the area east of Gilbert, Ariz., where an infestation of pink bollworm was found in the 1938 crop, has been continued. This field cleaning, which consists of cutting and burning cotton stalks, together with bolls, locks of cotton, and other material, which has fallen or shattered to the ground, is the initial procedure in the eradication program for the infested area. In addition to stalk cutting done by hand with machetes, six especially made sled cutters have been used in this phase of the work. A stalk-burning machine, or incinerator, has also been in operation. A very thorough cleaning job has been accomplished with the incinerator when the fields have been dry enough for its use. The dried cotton stalks are used as fuel, and as the machine is moved along the cotton rows all surface material is burned, and the hot blaze given off kills any pink bollworms which might have entered the top soil. Clean-up operations were first begun in the fields known to be infested, but have now been extended to adjacent fields and several miles beyond. Recent reports show that cleaning has been completed on 1,724 acres, and stalks have been cut on 2,361 acres. Work has been interfered with from time to time, owing to unusual weather conditions in the valley. Cold weather, accompanied by considerable rain and snow, has prevailed over the section during the last few weeks.

Survey work with autogiro in the Coastal Bend area.--After it was found, through examinations of gin trash from the 1938 cotton crop, that pink bollworm infestation had spread to the Coastal Bend area of Texas, an eradication program was inaugurated in an effort to stamp out this initial infestation. Owing to very similar climatic and crop development conditions, practically the same program as that followed in the lower Rio Grande Valley was put into effect. An important part of this plan called for destruction of cotton stalks in all cultivated fields after harvesting had been completed. The destruction of all seen or sprout cotton occurring in the area was also necessary. In many cases this sprout cotton occurs in abandoned fields in isolated places and cannot readily be seen from the ground. In an effort to locate all such fields the autogiro, which had been used in making a survey in the lower valley, was brought to the Corpus Christi area for the purpose of making similar observations. Flights were begun on January 25 and the survey work was completed on February 2. Information of real value was obtained. Three fields were found which had the stalks still standing, and in addition 2 unknown fields were located in the southwest corner of Brooks County; 25 scattered fields in Jim Wells County; 7 in Mueces County; and 4 in Kleberg County. In addition to the information, the survey enabled the inspectors, who acted as observers during all flights, to familiarize themselves with the cultivated areas under their supervision.

Notes from the Big Bend of Texas.--Pink bollworm damage was extremely heavy in the Big Bend section during the last crop season, and it is believed that the mild winter of 1937-38 accounted in a large measure for this condition. The present winter has been the coldest in this section of the State for a number of years. At Presidio the temperature has been below freezing

for a total of 414 hours through January. During this period there have been 39 hours of temperature below 20°. It is believed that this extremely cold weather, together with considerable moisture which has been present in the soil, will result in high mortality of the pink bollworm. An effort was made to reduce the number of hibernating larvae through the stalk-destruction and field-cleaning program carried on in the fall. Retarded planting of the coming crop, another part of the 2-year control plan, is expected to be carried out. A State Proclamation, which sets the planting date at April 20, has been distributed throughout the area. Preparations for the new crop are going forward in every part of the district. It appears certain that about half of the cotton acreage in the Big Bend will be planted to Acala variety.

Reports from southern Florida.---Good progress continues to be made in the wild-cotton eradication work in southern Florida. The Marathon section was completed during the week and a second cleaning was made of colonies in the Key West section and certain keys in this area. Several mature wild cotton plants were found and considerable vegetation was cleared off in order to hasten germination of any cottonseed remaining in the soil. Work was completed during the week on the ocean side of Plantation Key and the inside of Key Largo. An inspection of 500 bolls from Lignum Vitae Key was made, resulting in the finding of 4 pink bollworms. Several hundred bolls from the lower end of Key Largo were also examined and 8 pink bollworms were found. Work schedule at Cape Sable is still being maintained. The first cleaning will be completed about a month earlier this year than last. It is not desired to complete the second cleaning too early in the spring, and the number of workers may be further reduced. Crews in Manatee and Hillsborough Counties continued to do considerable scouting in their respective areas. The Pinellas County crew will probably complete their first cleaning of the season during the next 2 weeks. The autogiro, which has been used in quarantined areas of southern Texas, arrived in Miami on the afternoon of February 4. The first observation flights were made early in the week after some necessary repairs had been made to the machine. The primary purpose of these first flights was for general observations and to familiarize the various inspectors with the areas they are to work. Some doubtful sections, however, were noted, and it is planned to check these areas as soon as possible. During the latter part of the week observations were made over the Cape Sable area. Flights over the southern portion of the Ten Thousand Islands section will follow, after which additional flights will be made over the Cape Sable area. It appears that about 3 weeks will be required to complete the survey in southern Florida.

Thurberia plant eradication in Arizona.---The work of locating and destroying colonies of Thurberia plants, host of the Thurberia weevil, which attacks cultivated cotton, was continued in the mountain ranges of southern Arizona throughout January. Toward the end of the month work in Ventana Canyon had almost been completed. During the period a total of 108,606 plants was removed from 1,600 acres. Forty (40) acres of this land consisted of a section of mountains over which a severe forest fire passed in 1937, which almost completely destroyed all the native plants. On this 40 acres a total of 46,233 Thurberia plants of all sizes, from seedlings to plants 2 and 3 feet in height, was removed. This number of plants consisted

of 8,318 large, 36,022 small, and 1,893 seedling plants. Toward the end of the month preparations were under way to begin eradication operations in the vicinity of the Continental Ranch, about 28 miles from Tucson. This is the first work in connection with the program which calls for the removal, as far as possible, of *Thurberia* plants near the cultivated cotton-growing areas of the Santa Cruz Valley, where an infestation of *Thurberia* weevil was found in a large number of fields during the last season.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Tobacco moth capable of subsisting on food materials other than tobacco.--In connection with a study of control methods for the tobacco moth as a pest in growers' packhouses, J. P. Vinzant, of the Richmond, Va., laboratory, found that under optimum conditions of temperature and humidity many larvae of *Ephestia elutella* Hbn. completed their life cycle and emerged as adults when fed on peanut meal, rolled oats, cottonseed meal, horse feed (consisting of cracked corn, oats, bran, molasses, and salt), rye seed, and wheat bran. No emergence of moths took place in cages where the larvae had fed on barley and scratch grains commonly used for chicken feed. Samples of several brands of hog and chicken feed, cracked corn, rye, and wheat, collected in the barns of tobacco growers in North Carolina, where an outbreak of the tobacco moth occurred in the packhouses, failed to disclose any infestation or moth emergence of *E. elutella*. It is apparent from these tests that it is possible for the tobacco moth to subsist on substances ordinarily found in or near tobacco growers' packhouses, but at the present time this phenomenon is not taking place to an extent that would account for the damage caused by the tobacco moth in growers' packhouses in certain counties of North Carolina and Virginia in the fall of 1938.

Tests with metaldehyde against slugs in greenhouse.--C. A. Weigel and G. V. Johnson, of the Beltsville, Md., laboratory, found, in preliminary trials under greenhouse conditions that metaldehyde, when made up as a bait with wheat bran, attracted large numbers of slugs and resulted in heavy mortality. The bait was made up at the rate of 2 ounces of wheat bran, 1 gram of metaldehyde, and 30 cc of water. Sunlight the day following the application of the metaldehyde bait seemed very necessary in order to produce the desiccation of the slugs that became affected after feeding on the bait. On the other hand, indications were that, if cloudy weather prevails, some recovery of slugs may occur the next day or two after treatment. Comparable tests with paraldehyde and paraformaldehyde, also known as trioxymethylene, showed that, although these materials, made up in essentially the same manner as the metaldehyde bait, apparently possessed some degree of attractiveness to slugs, they had little or no effectiveness against these pests.

Increase in pea weevil infestation in Washington and Idaho in 1938.--According to a report submitted by T. A. Brindley and F. G. Hinman, of the Moscow, Idaho, laboratory, the annual summation of the data collected on infestation by the pea weevil (*Bruchus pisorum* (L.)) in the Palouse area in Washington and Idaho, as obtained from the records of the Pea Grading Service of the Bureau of Agricultural Economics, cooperating with the Department of Agronomy of Idaho, disclosed that on an average approximately 12½ percent of the peas examined were found to be infested by the weevil. This

involved an examination of 578 graded crops. This figure indicates an increase of approximately 5 times the average pea weevil infestation present in a comparable area in 1937 and indicates that the 1938 infestation of the pea weevil was one of the most severe on record. The marked increases appear to be attributed principally to two influences: (1) A mild winter (1937-38) which allowed a high rate of survival of the adults; (2) the pea acreage in the Palouse area was reduced greatly in 1938 and the average yield per acre was considerably less than during previous years, apparently resulting in a higher degree of concentration of the weevil population on the relatively small number of peas available for oviposition. The following tabulation shows the average and the maximum infestation by the pea weevil in Washington and Idaho and in the combined area for the period 1934-37.

Year :	Washington :		Idaho :		Average for territory
	Average	Maximum	Average	Maximum	
	Percent	Percent	Percent	Percent	Percent
1934---	3.64	33.2	4.48	55.6	3.95
1935---	2.77	27.2	4.41	41.5	3.35
1936---	1.93	17.3	4.18	35.1	2.69
1937---	2.21	37.1	3.50	29.7	2.57
1938---	9.77	56.0	19.57	70.5	12.51

Cryolite dust mixture effective against corn earworm on lima beans.---

In summarizing the results of an experiment performed on the Eastern Shore of Virginia, designed to determine the number of insecticidal treatments necessary to control Heliothis obsoleta (F.) on Fordhook lima beans and to test the relative effectiveness of a cryolite-corn meal bait, in comparison with a cryolite dust mixture for controlling this insect, it was indicated that three treatments of a cryolite-talc dust mixture, starting the first treatment when the plants were beginning to bloom and applying the later treatments at approximately 14-day intervals gave the best control of the corn earworm, as determined by the reduction in the number of wormy pods in the treated and untreated plots grown under comparable conditions. Cryolite-corn meal bait scattered on the plants by hand at the rate of 50 pounds per acre per treatment applied at the same time and time-interval as the cryolite-talc dust mixture was not as effective as the latter, the reduction in the wormy pods per plant being 52 percent with the cryolite-corn meal bait, as compared with an average of 89 percent reduction in the plots where the cryolite-talc dust mixture was applied. When the cryolite-corn meal bait was scattered down the middles of the rows, using the same dosage as was applied to the plants, a reduction of only approximately 6 percent in wormy pods was obtained, indicating the necessity of applying this material directly to the plants.

Plant sugar beets early to combat beet leafhopper.---As the result of detailed tests performed during the season of 1938, in south-central Idaho, L. G. Peay and R. N. Hoffmaster determined that in the presence of infestations of Eutettix tenellus Bak. the earliest planted sugar beets gave the highest yield, the lowest percentage of beets developing disease, and the highest percentage of beets that recovered from the disease. These experiments were staged with one variety of nonresistant sugar beets and three

varieties of resistant sugar beets. The beets were planted at 12-day intervals, beginning on March 15. Throughout the season there were more leafhoppers on the nonresistant than on the resistant varieties. There were approximately 18 percent more leafhoppers in the second planting of beets than in the first planting and 50 percent more in the second than in the third planting. Early infestation by E. tenellus caused a very high percentage of all varieties of beets to develop obvious disease symptoms early in the season. The highest percentage of disease occurred in the planting which maintained the highest leafhopper population. Very few beets completely recovered from the disease, which was probably due to the early infection. Of the number of beets which recovered, approximately 78 percent were from the first planting. The beets which recovered from the onset of curly-top disease weighed approximately 61 percent more than did the diseased beets which did not recover. Healthy beets weighed on an average approximately 3 pounds each, which at this rate would have given a potential yield of approximately 41 tons per acre had all the beets been healthy. In general, the early planted beets had lower leafhopper populations, a higher percentage of recovered beets, and gave better yield.

FOREIGN PLANT QUARANTINES

Merodon sp. larvae in Leucejum bulbs.--Four larvae of Merodon sp. were taken from Leucejum sp. bulbs from Holland at the port of New York on September 29, 1938. This represents the fifth time that this insect has been taken from Leucejum bulbs. Three previous interceptions have been made at the Inspection House, Washington, D. C., and one at San Francisco. All infested bulbs were from Holland.

A handful of weeds.--On December 14, 1938, while inspecting at the San Juan airport a local airplane returning from St. Croix, American Virgin Islands, the alert eye of Inspector Jose Luciano noted a heavy wisp of weedy growth caught in the plane's landing gear. On taking off in St. Croix the plane had bounced into a weedy portion of the landing field and had carried away a stringy mass of straggling vegetation. This accidentally acquired plant importation remained with the plane until it reached San Juan, where it was detached by Mr. Luciano and brought to the office for examination. It consisted mainly of a vine-like trailer, Ipomoea quinquefolia, with portions of three other weed plants and six grass species mixed in. On the Ipomoea was found a distinct leaf-spot disease, and the dying stems were covered with fungus pustules. One of the two seed capsules present on two fragments of another plant contained a living larva and in a third plant (probably Mimosa pudica) eggs and evidence of larval feeding were observed in the leguminous pods.

Termites in the mails.--On October 22, 1938, a package was inspected in San Juan, addressed to a person living in New York City. This package was found to contain a small termite nest filled with living termites which were later identified as Nasutitermes (N.) costalis Holmg., West Indies. Why were these termites being sent to New York? Was it idle curiosity on the part of the addressee to see a termite nest? Inquiry revealed that it is common practice in Puerto Rico to burn a termite nest and inhale the fumes as a medicinal remedy for chest ailments. Others boil the termites in water and drink the broth expecting some curative result.

Lepidopterous larvae on medicinal shoots.--Living larvae of the geometric Synchlora frondaria Gn. were collected on November 4, 1937, in Puerto Rico, on shoots of Adenoropium multifidum (Tartago emetico). The shoots originated at Rio Piedras, P. R., and were for medicinal purposes. The larvae were found when the shoots were presented for examination before being mailed to the continental United States.

Entomological interceptions of interest.--Two living larvae of the fruitfly Anastrepha mombinpraeoptans Sein were intercepted at Mobile, Ala., on September 9, 1938, in a mango fruit in ship's stores from Jamaica. Fourteen living and four dead larvae of an Anastrepha species were intercepted at New York on October 24, 1938, in two mango fruits in baggage from Colombia. Two adults of the weevil Apion pomonae F. were taken at Chicago, Ill., on September 21, 1938, in vetch pods in cargo from England. A living specimen of the lygaeid Orthaea vicinalis (Dist.) arrived at Seattle, Wash., on October 4, 1938, on an orchid (Cattleya sp.) leaf in cargo from Colombia. Specimens of the thrips Frankliniella cubensis Hood and Heterothrips sericatus Hood were intercepted at Miami, Fla., on September 5, 1938, on rose blooms in baggage by airplane from Haiti. A living adult of the weevil Attelabus corvinus Gyll. was found at New Orleans on September 30, 1938, on a banana fruit in cargo from Mexico. A living specimen of the pentatomid Ochlerus marginatus (F.) was taken at Galveston, Tex., on November 7, 1938, among bananas in cargo from Mexico. Specimens of the ant Pheidole nodus F. Sm. arrived at Sumas, Wash., on October 20, 1938, with lily bulbs in cargo from Japan. A living larva of the vine moth (Polychrosis botrana Schiff.) was intercepted at New York on November 4, 1938, on a grape berry in baggage from Hungary. This tortricid, which attacks the blossoms and fruit of the grape, occurs in Europe, Asia, and Pacific Islands. Living specimens of Taeniothrips ericae (Haliday) were found at Buffalo, N. Y., on August 18, 1938, on heather in the mail from Scotland. Two living adults of the bruchid Pachymerus luteomarginata (Chev.) were intercepted at Washington, D. C., on October 24, 1938, with seed of Desmoncus polyacanthos in the mail from the Canal Zone.

Pathological interceptions of interest.--Spotting of tomatoes from Argentina, examined at Boston on January 20, seemed to be due to Bacterium vesicatorium Doidge. Ditylenchus dipsaci (De Man) Filipjev and Helminthosporium allii Campanile were found on garlic from Singapore, Straits Settlements on January 20, at Boston. Heterodera marioni (Cornu) Goodey was found in galls on beets from South Africa taken on January 31 at Philadelphia. Melampsora abietis-capraearum Tubeuf was intercepted at the El Paso foot-bridge on January 12, on willow leaves from Mexico. Phoma citricarpa McAlpine was found on oranges from Australia on January 6 at New York. Phragmidium disciflorum (Tode) James was found on August 4, 1938, at New York on rose cuttings in baggage from Italy. On January 27 Phytophthora infestans (Mont.) DeBarry was found at New York infecting a tomato in a cargo shipment from Canary Islands. A diseased pumpkin from Barbados, examined at New Orleans on January 25 was found to bear numerous sclerotia of Sclerotium rolfsii Sacc. Garlic from Singapore, Straits Settlements, examined at Boston on January 20, was covered with small black sclerotia determined as Sclerotium sp., but resembling the sclerotial stage of Botrytis squamosa Walker. Thielaviopsis basicola (Berk.) Ferraris was intercepted on January 11 at El Paso in sweet-potatoes carried by a pedestrian from Mexico. Uredo oncidii P. Henn. was

intercepted at San Francisco on a number of plants of Oncidium cavendishianum in each of four special permit shipments from Mexico on May 13, 14, 17, and 18, 1938. A rust found on Tournefortia sp. in air express from Wake Island on February 22, 1938, at Honolulu was determined as Uredo sp. The specialist to whom the material was forwarded expects to name and publish the new species later.

DOMESTIC PLANT QUARANTINES

Quarantine activity discussed at December meeting of entomological association.--The present quarantine structure and methods of nursery inspection were given thorough consideration by the section on plant quarantine and inspection, at the annual meetings of the American Association of Economic Entomologists held in Richmond last December. At the request of State officials, the papers presented which relate to quarantine and inspection activities have been mimeographed and distributed. Such papers were as follows:

What will be the Next Step taken toward Progress in Nursery Inspection?
E. L. Chambers, State entomologist, Madison, Wis.

The Plant Quarantine Act and Quarantine No. 37. Lee A. Strong,
Chief of Bureau.

Trends in Pest Control Regulatory Action. M. S. Yeomans and
Milledge Murphey, Jr., Georgia Department of Entomology,
Atlanta, Ga.

Regulatory Laws and State Boundaries. R. P. White, executive secretary,
American Association of Nurserymen, Inc., Washington, D. C.

Regulatory Measures as They Affect Transportation of Plants and Plant
Products by the Railroads. W. C. Kendall, chairman, Car Service
Division, Association of American Railroads, Washington, D. C.

Post Office Cooperation in the Observance of Plant Quarantines.
Nelson B. Wentzel, superintendent, Division of Classification, Post
Office Department.

White-fringed beetle quarantine activities.--A cooperative attitude on the part of the public toward the activities concerned with the enforcement of the recently issued Federal quarantine on account of the white-fringed beetle is the subject of comment on the part of inspectors in the regulated areas. Personal contacts have been made by the inspectors with carriers, nurserymen, produce dealers, farmers, and others to familiarize them with the provisions in shipping from the regulated areas, and the boundaries of such areas are being posted with quarantine signs. In the New Orleans nursery area, inspectors are devoting their attention to the supervision of the potting of nursery plants in sterilized soil, and the New Orleans markets are manned at all times to insure that produce moved by truckers meets the conditions of certification. The work at Mobile is concerned with that part of the city under regulation, comprising the railroad yards, docks, mills, retail and

wholesale establishments, and several blocks of the residential districts. Throughout the regulated areas of the infested States, the movement of restricted articles, with the exception of nursery stock with soil, was light in January and patrol inspectors found few violations.

White-fringed beetle inspection.--Larval survey for the white-fringed beetle was continued in January in nurseries and adjacent properties in the vicinity of East Baton Rouge and St. Tammany Parishes, La.

White-fringed beetles still found in adult stage.--White-fringed beetles were collected throughout the month of January at Gulfport, Miss., and two were found in New Orleans on January 11.

Quarantine restrictions on the white-fringed beetle.--Circulars B. E. P. Q. 485, 486, 488, and 489, all relating to the white-fringed beetle quarantine, were issued in January. These modifications relate to part-year removal of certification requirements for specified articles from designated portions of the regulated areas; treatment of potted plants and potting soil; and reshipping from regulated areas, restricted articles originating in foreign countries.

Transit-inspection activities.--A study was recently made to ascertain the volume of express and Railway Mail Service shipments coming into Chicago from areas regulated under Federal quarantines. Some 15,000 sack labels were collected over a 24-hour period, representing an average day. The time, within half-hour periods, was determined as to when the parcel-post shipments were available for inspection at conveyor belts and chutes, and the tours of inspection arranged accordingly. Violations found by transit inspectors in December totaled over 600, more than two-thirds of which originated in the gypsy moth quarantine area. One of the violations intercepted in New York was consigned to Puerto Rico. Although January marked the usual low shipping point in the year, 63 apparent violations were found that month. Interdealer requirements in the Japanese beetle area are checked and 2 such infringements were reported. Transit inspectors at Pittsburgh, in their contacts with express car loaders, took advantage of the seasonal lull by interesting these men in the plant-quarantine work. With a better knowledge on the part of these men of the type of shipment which needs to be inspected, more material has been held for inspection without interfering with the loading.

Peach-disease control activities.--Tree-removal work in January was conducted in 41 counties in Alabama, Arizona, Arkansas, California, Colorado, Georgia, Mississippi, Tennessee, and Utah. With the increased force of over 800 relief laborers, there were removed from the above States over 735,000 abandoned and escaped peach trees, over 2,700 mosaic and 138 phony peach trees. January 14 marked the completion of the removal in Mississippi of all phony trees found in the 1938 inspection season.

California peach-mosaic survey.--State survey work in 26 counties in California in 1938 resulted in finding no peach mosaic disease, according to a report from the Bureau of Plant Pathology of the California State Department of Agriculture. Over 2,000,000 stone-fruit trees were represented in the plantings inspected.

Alabama quarantine on phony peach disease revised.--Standard areas and uniform requirements are maintained in the phony peach disease quarantine of the State of Alabama, which was revised effective February 9. There have been eliminated from the regulated areas such parts of Maryland and Oklahoma as were formerly under regulation, one county each in Illinois and Missouri, and three in Kentucky, in consideration of their apparent freedom from the disease for the last 3 years.

Progress in sweetpotato weevil eradication.--The eradication and control measures for the sweetpotato weevil, which have been conducted in Alabama, Mississippi, Georgia, and Texas cooperatively with those States since July 1937, is effecting a sharp decline in such infestations. Reinspections were made in 1938 of the entire area in which survey and control measures were conducted the previous year, and it was found, the project leader states in his annual report, that of the 477 infestations which had been located in 1937, 430 of them, or 90 percent, were apparently eradicated. Cultural practices were, for the most part, the means of effecting such clean-up. Safeguards as to the growing, storing, and movement of the host plants within the regulated areas come within the provisions of the standardized quarantines adopted by the four above-mentioned States.

Sweetpotato-weevil inspectors meet.--Plans for field activities in the current year, as well as the work of the past season, were discussed at a general meeting of Federal and State inspectors at Gulfport, Miss., on January 27 and 28. K. L. Cockerham and Stephen S. Easter, on sweetpotato weevil investigational work at Sunset, La., were present also.

Citrus canker eradication.--Inspection for citrus canker was resumed in Louisiana on January 16, with a force of nine experienced inspectors, five Federal, and two State men, the fall and winter activities of the project having been devoted to Texas areas. One infection of citrus canker was found by Louisiana State inspectors prior to January 16 in Terrebonne Parish. Work is continued in Texas. The eradication of abandoned citrus trees at Carrizo Springs, Tex., has been completed, and inspection was continued in Galveston and Brazoria Counties.

Power dusters reduced cost of Mormon cricket control.--The most striking development in the 1938 Mormon cricket control operations, as compared with those of former years, was perhaps the large increase in the number of power dusters operated and the marked decrease in the number of hand dust guns used. This development, according to the field project leader, was primarily responsible for the decreased cost of control, as the hiring of labor is the most costly item in the expense of control and each power duster displaced from 20 to 30 laborers.

Grasshopper control activities outlined for 1939.--A tentative program for grasshopper control in 1939, contingent on the availability of Federal funds, has been outlined following the conference of Federal and State officers held at Omaha last November. Federal emphasis will be placed on crop protection, as heretofore. The program varies but little from that of 1938, except as to areas in which the dominant grasshopper species show strong migratorial tendencies and where, owing to the sparsity of the human population and the existence of large areas of abandoned or reverted lands, it

would be impossible for the local manpower to carry out successful control. In these areas a joint Federal-State program is proposed, which will undertake responsibility for the application of bait. Activities directed against the two principal migratory species will be extended to concentration grounds of nymphs and adults in areas where effective control is believed to be feasible and practicable. Such operations, it is anticipated, will embody the area infested with Dissosteira longipennis Thos., comprising parts of Colorado, New Mexico, Oklahoma, and Texas and that infested with Melanoplus mexicanus Sauss., comprising parts of Montana, North Dakota, South Dakota, and Wyoming.

CONTROL INVESTIGATIONS

Nicotine gas toxicity increased.--H. E. Richardson and A. H. Casanges, of the Beltsville, Md., laboratory, have found that the addition of carbon dioxide to nicotine gas increased the speed of paralytic action of the fumigant against the peach aphid (Myzus persicae (Sulz.)). Final mortality, however, was increased only to a small extent. Further tests have again indicated the detrimental effect of high humidity in nicotine fumigation. Under the conditions of the laboratory air-flow method of testing, this is only noticeable at the lower nicotine concentrations (.0052 ng/L.) but under practical conditions where the nicotine is applied in one large dosage it is apparent at the higher concentrations.

Homologs not superior to paris green.--Twelve copper arsenite compounds similar to paris green have recently been tested by the Sanford, Fla., laboratory to determine their usefulness as possible substitutes for paris green. The materials, prepared by F. E. Dearborne, of the Division of Insecticide Investigations, are combinations of copper arsenite and copper salts of different fatty acids. The toxicity of all the samples was high but those containing salts of the higher fatty acids were more difficult to use, because of their waxy nature. With regard to toxicity, no significant difference was found between any of the samples and paris green. All the samples were sprayed on young bean, collard, and squash plants and were almost equally injurious. It is concluded, therefore, that the compounds have little promise as substitutes for paris green.

INSECTICIDE INVESTIGATIONS

New method to replace Gutzeit method for arsenic.--A new method for determining small quantities of arsenic has been developed in the Division of Insecticide Investigations which, because of simplicity, accuracy, and other advantageous features, it is believed will supplant the long-used Gutzeit procedure. The method is essentially an arsine evolution, followed by absorption of the arsine in mercuric chloride and an iodine titration. The time required per determination is approximately 7 minutes, whereas the Gutzeit requires at least $1\frac{1}{2}$ hours. This method is capable of determining from 5-500 micrograms (0.005-0.500 mg) As_2O_3 with an average recovery of 99.5 percent and a standard deviation of 0.8 percent. The procedure is not limited to a sample of 30 ml volume, as is the case with the Gutzeit, but can handle up to 60 or 70 ml samples.

Renewed studies on the noncrystalline constituents of derris and cube.--Extractives prepared from derris and cube contain, besides rotenone, principally deguelin. Deguelin has never been obtained by direct crystallization, but is only obtained in the optically inactive form when the extractives are treated with mild alkali. Insecticidal tests have shown deguelin to be the constituent next in importance to rotenone and, as previous work in the Division has indicated that deguelin exists in the plant in the *levo* rotatory form, a renewed study has been undertaken by L. D. Goodhue to obtain this form in the crystalline state. Extractives that have been freed of rotenone and toxicarol have been subjected to distillation in very high vacuum (pressure = .001 mm). The distillates obtained consisted largely of *levo* rotatory deguelin in amorphous form and so far all efforts to crystallize the material have been unsuccessful. In the course of the work it has been discovered that inactive deguelin forms solvates and, just as in the case with rotenone, the compound formed with carbon tetrachloride has been made the basis of a new method of estimating the deguelin content of derris and cube roots. Thus carbon tetrachloride differentiates between optically active rotenone and optically active deguelin to permit the separation and estimation of the former, and then after racemization, for which a convenient method has been developed, gives the inactive deguelin.

BEE CULTURE

More reasons why American foulbrood is hard to eliminate.--During the past season observations were made by A. W. Woodrow, of the Intermountain States Bee Culture laboratory, Laramie, Wyo., on the activity of bees in the removal of the remains of brood dead from American foulbrood. He reports: "Calculations were made to determine whether the different colonies varied in the time required for the removal of diseased material from the cells, and whether this was closely related to the successful reduction of disease within the colonies. The average time required for complete removal of diseased brood ranged from 1.2 to 10.9 days for the various colonies. These values are in fairly close agreement with those obtained last year. The colonies having the least diseased brood gave the lowest average time but most of these were examined more frequently than those with more disease. The colonies having more disease apparently required more time as the number of diseased cells increased in them. As the averages obtained are based only on cells in which complete removal was attained, they only indicate roughly how long diseased material remains in colonies. The rapidity with which diseased cells were cleaned out indicates that diseased cells found on one inspection were not likely to be found later when inspections are spaced several days apart. The appearance of diseased cells within a colony presents a progressive and changing picture, rather than an accumulative one. The number of diseased cells present in a colony at a particular time do not show how many cells have appeared but only indicate how much brood is affected at that time. In ordinary routine examinations made at intervals of several days or weeks, many diseased cells may appear and be cleaned out before they are seen. Light infections under these circumstances may be undetected entirely when infrequent inspections are made for the presence of disease. Small particles of diseased brood are frequently present at the bases of cells which are being cleaned out by the bees, but these are extremely difficult to detect and probably are

seldom seen in ordinary colony inspection. These factors probably help to explain why it is so frequently a difficult and prolonged fight to eliminate American foulbrood completely from an apiary, particularly one in which the initial infection was light."

Giving water may aid package bees at high temperature.--Investigations by Mr. Woodrow, assisted by H. J. States, Jr., on the development of standardized survival test methods for adult bees indicate that at high temperatures bees will live longer if water is available to them, in addition to a sucrose solution, than they will without it. The following is from a report on their work for the last quarter: "Tests on the relation of temperature to the longevity of caged bees were begun this quarter. One test was begun October 6 with cabinets operating at 111.3°, 105°, 102.6°, and 97.9°F. Relative humidities of 23-24 percent were maintained by the use of calcium chloride solutions. Five cages of bees were placed in each cabinet. All were fed 50 percent sucrose solution and extra water was given in outside feeders set on the wire screen of the cages. The bees held at 111.3° were all dead at the end of 3 days, but probably died in less than 2 days. The second day was Sunday and no observations were made. The bees at 106°F. all died in an 8-day period. Some of the bees at 102.6° lived 3 weeks. Only a few bees in most cages at 97.9° had died in 3 weeks. The mortality at the temperature for the 3 weeks ranged from 5.4 to 17.4 percent. A large quantity of water was used by the bees at the higher temperatures. In some cases the bees did not seem to obtain the water readily; in other cases the water supply became exhausted between observations, even when three vials of water, each containing about 20 cc, were supplied. * * * As there was considerable variation in the death rate in the various cages in this test, probably related to the water supply, it was terminated at the end of 3 weeks and another was begun." In the new test the bees had free access to water at all times. The results are shown in the following table.

Tempera-: Relative	:	Water : 50 percent	:	50-percent sucrose and water			
ture : humidity ^{1/}	:	only : sucrose only:	No. 1:	No. 2 :	No. 3 :	No. 4	
<u>°F.</u>	:	<u>Percent</u>	:	:			
112	:	16	:	O.K. at: Half dead at:	All four cages in good condition		
	:		:	6½ hrs: 6½ hrs.	:	at 6½ hrs.	
--	:	--	:	All cages:	All bees dead at end of 1 day.		
	:		:	Average length of life in days; food as in columns above.			
108----	17	:	2.0 :	1.0 :	1.3:	1.6 :	
104----	18	:	3.0 :	1.6 :	5.2:	9.0 :	
100----	18	:	4.0 :	2.1 :	29.6:	31.4 :	
		:			2/29.1 :	2/32.9	

^{1/}Relative humidity subject to correction for position of bees which will raise it above 3-5 percent.

^{2/}Average estimated, as not all bees have died.

The report continues: "The bees fed sucrose solution without water in each of the cabinets died more quickly than those given water without sucrose solution. The cages were filled the afternoon of November 16 and placed on a laboratory table until the next morning, when they were placed in the cabinets at different temperatures. During this period all were fed 50 percent

sucrose solution and water. The need for water at the higher temperatures is clearly evident. The length of time required for starvation was increased as the temperature was lowered. Some bees fed 50 percent sucrose solution and water in the cabinet operating at 100° are still alive, but the average length of life is estimated to be about 29 to 32 days for these four cages. Death rates have been increasing rapidly during the latter part of the exposure period. Mass examinations were made of the intestinal content but no *Nosema* or *Malpighamoeba* or other abnormality was found. Numbers of bacteria were present but no more than were observed in dead bees taken from normal colonies. Some bees removed from the cages at the lowest temperature in the latter part of the period were well distended with feces, but only a few discharged fecal material before death occurred. The shorter length of life of the bees fed only sucrose solution at these temperatures suggests that package bees may be able to withstand high temperatures much better if water is available to them in addition to sucrose solution, or if the concentration of the sirup provided is changed according to the conditions to be met. The sirup should be lighter for hot weather and heavier for cool weather. If water were provided, the bees would have the opportunity of making the adjustment themselves."

IDENTIFICATION AND CLASSIFICATION OF INSECTS

Interesting beetle larva added to collection.--A coleopterous larva of unusual scientific interest was intercepted in January by the Division of Foreign Plant Quarantines. The inspectors at New York found the specimen under the bark of a Primavera log, from Guatemala. The larva appears identical with that of *Physeia setosa* Chaud., described by van Emden in 1936, and in all likelihood belongs in the genus *Physeia*. Insofar as is known the specimens which van Emden had and the one intercepted at New York are all that are known of this group in the world. The genus belongs in the Carabidae, tribe Ozaenini, the members of which are reported as inhabiting ants' nests, usually in the tropics. This larva is of particular scientific interest because it is intermediate between the Carabidae and Paussidae and definitely establishes the close relationship of these two families.

The scientific name for the tomato worm.--The taxonomic and nomenclatorial problems involved in this question were recently carefully investigated in order to permit an authoritative reply to a request from the Division of Truck Crop and Garden Insect Investigations. It was concluded that *Protoparce sexta* (Joh.) is the proper combination.

Addition of Tabanidae to National Collection.--An exchange of specimens has been made with Prof. P. A. Buxton, of the London School of Hygiene and Tropical Medicine, whereby 145 specimens of 69 species of Tabanidae, 31 of which were new to our collection, were received. Most of the species were African, although some Oriental and Palearctic species were included.

Ectoparasites from island of Guam.--Two well-known ectoparasites of the dog--the brown dog tick (*Rhipicephalus sanguineus* Latr.) and the dog flea (*Ctenocephalides canis* (Curt.))--were recently sent in for identification from the island of Guam. They were collected by R. G. Oakley.

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NEWS LETTER

VOLUME VI

no. 4



UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

NEWS LETTER

FOR FEBRUARY 1939

Vol. VI, No. 4

(Not for publication)

April 1, 1939

ADMINISTRATION

The First Deficiency Act for the fiscal year 1939, approved March 15, provides \$3,000,000 to enable the Bureau to cooperate with State and local agencies in combating incipient and emergency outbreaks of insect pests and plant diseases. The amount appropriated is less than the amount requested in the Department and Budget estimates, making it necessary to materially reduce the cooperative work to be carried on under this appropriation. The activities to be conducted under this appropriation, as approved by the Secretary, include cooperation with States to suppress the incipient outbreaks of the white-fringed beetle and prevent its spread; cooperation with States in control of the Mormon cricket; and cooperation with States in the control of grasshoppers.

In the work on control of grasshoppers, first attention will be directed to the protection of cultivated crops. A limited amount of work will, however, be carried on in cooperation with certain States on idle land to control grasshoppers that have migratory tendencies, such as the lesser migratory grasshopper in parts of Montana, Wyoming, North Dakota, and South Dakota and the long-winged grasshopper in parts of Colorado, Texas, and Oklahoma.

In discussions before the Budget and committees of Congress, the Department committed itself to provide adequately for suppression work against the white-fringed beetle and by general agreement it was understood that provision would be made for the enforcement of the Federal quarantine on account of the white-fringed beetle by allotments from this appropriation until such time as funds were otherwise provided for that purpose.

W. E. VON ROSENBERG

William Edward von Rosenberg, Associate Plant Quarantine Inspector, Division of Pink Bollworm Control, died at San Antonio, Tex., on January 26, 1939, at the age of 42 years. Mr. von Rosenberg was connected with the pink bollworm activity exactly 20 years, entering the Department of Agriculture on January 25, 1919, in the unit known at that time as the Federal Horticultural Board. He was graduated from Texas A. & M. College with the Class of 1918, and served as Second Lieutenant in the Army prior to entering the service of the Department.

FRUIT INSECT INVESTIGATIONS

A stable emulsion of ethylene dichloride.--Oliver I. Snapp reports that studies made at the Fort Valley, Ga., laboratory show that ethylene dichloride, emulsified by a simplified method for control of the peach borer, results in an unusually stable emulsion. A batch of 50-percent ethylene dichloride emulsion prepared by the simplified method on October 10, 1938, was holding up well on February 28, 1939, and appeared to be just as stable on the latter date as on the day it was made. The simplified method of preparation consists of the addition of eight volumes of water to one volume of potash fish-oil soap, containing approximately 30 percent of soap, after which nine volumes of ethylene dichloride are added and the constituents emulsified cold by pumping. A 50-percent emulsion of ethylene dichloride prepared in this way was kept at the Fort Valley laboratory for a period of 41 days without breaking down and with no reduction in its effectiveness against the peach borer.

Cube extract increases effectiveness of oil sprays against red scale.--A. W. Cressman, of the Whittier, Calif., laboratory, reports that spray tests against California red scale on lemons have shown that the effectiveness of oil sprays can be markedly increased by the addition of cube extract to the oil, using a mixture of trichloroethylene and dibutyl phthalate as a mutual solvent. A field spray containing 2 percent of a heavy oil killed only 59 percent of the mature scales in heavy infestations on the older wood. The addition of cube resins at the rate of 1 part to 4,000 parts of dilute spray increased the mortality to 94 percent. A higher mortality was obtained on other parts of the plant. On the leaves sprayed with oil alone the mortality was 94 percent, while no survivors were found on the leaves treated with oil-cube in a count of 1,000 scales. Cube extract has produced a larger increase in mortality when combined with the lighter oils than when used with heavy oils. In another series of field sprays using 1.5 percent of oil, mortalities of mature scales on the heavily infested old wood treated with heavy and light medium oils were 58 and 52 percent, respectively, the difference being significant. These mortalities were increased to 91 and 93 percent by the addition of cube extract, 1 to 4,000. The cube resins used in these tests contained 22 percent of rotenone. Laboratory tests have given similar results except that the differences between materials have been greater. Applications of heavy and light medium oils to infested fruit produced mortalities of 76 and 55 percent, respectively. When cube extract, 1-5,000, was combined with the same oils, mortalities were increased to 99 percent in both cases. The cube extract used in the laboratory tests contained 30 percent of rotenone.

Headquarters for survey unit moved from Little Rock to Chattanooga.--The headquarters for the mobile entomological laboratory operating in the Southeast on the survey of insects in peach orchards where the phony peach disease occurs was moved from Little Rock, Ark., to Chattanooga, Tenn., on March 6. A fixed laboratory is being organized at that point to study the host-plant relationships of certain peach insects suspected of being the possible vectors of the phony disease. The studies relating to foliage-feeding insects will follow the usual insectary methods, but special arrangements are being made to study and test the root-feeding forms. The work remains a

joint set-up with the Division of Domestic Plant Quarantines. The vector and virus studies are in cooperation with the Bureau of Plant Industry. The new laboratory is located at 700 North Crest Road, East Chattanooga, Tenn. The post office address is Box 5038, East Chattanooga, and the telephone is Chattanooga 2-3245. In driving to the laboratory from Chattanooga, one should take Tennessee Highway 58 east off from Market Street on 4th Street and follow this highway a distance of approximately 6 miles through East Chattanooga to the foot of Missionary Ridge, then turn right off Highway 58 up the ridge two blocks to North Crest Road. There is street car and bus line service from Chattanooga to East Chattanooga. W. F. Turner is in charge of the laboratory.

MEXICAN FRUITFLY CONTROL

Fruitfly increases.--The adult fruitfly population in the Rio Grande Valley, as revealed by trap catches, was higher in February than during any similar period in the history of this project. In January, only 154 flies were trapped, but early in February trap catches rapidly mounted and by the close of the month 2,150 flies had been submitted for identification. Many of the female flies were gravid when trapped. Some oviposition evidently took place late in January as the first larval infestation was discovered on February 14. Before the month closed 18 properties were listed as being infested. The fruit from these properties was harvested without delay and all fruit suitable for market was sterilized by the heat method before shipment.

JAPANESE BEETLE CONTROL

Regrouping of Dutch elm disease eradication and sanitation activities.--Beginning March 1, there was a regrouping and consolidation of the data accumulated concerning eradication, sanitation, and selective work performed by Dutch elm disease crews. Eradication of confirmed trees continues as a separate item. Elm-sanitation removals have been subdivided into a number of types of work, as follows: Beetle-infested trees, tagged dead and dying trees, dead and dying trees removed under a blanket permit covering an entire section, intensive local sanitation, clear cutting of "hot spots" of infection, and elms near confirmed trees. Also considered as a part of the sanitation operations are the disposal of woodpiles and the pruning of beetle wood. These sanitation operations have as their primary purpose the destruction of the fungus causing the disease and of beetle-infested material. The selective work has for its objective the reduction or simplification of field work and is not based directly on any disease or insect aspect of the program. It comprises such activities as the creation of elm-free areas, either through clear cutting or other operations, for the purpose of reducing costs and limiting the extent of the field activities.

Sodium dichromate counteracts corrosion.--Use of quantities of copper sulphate solution in tests made by the section engaged in the development of control methods has presented difficulties, owing to the corrosive action of the solution on most containers. When wooden barrels were used, the metal hoops were eaten away. Tin was soon corroded. Finally, copper kettles were obtained at considerable expense. In testing various mixtures in the tree-medication work, it was noted that an equal part of sodium dichromate solution added to the copper sulphate solution checked corrosion and the mixture could be kept in tin cans.

First-record Dutch elm disease confirmations.--Location of a confirmed tree in the town of Greenville, Orange County, N. Y., further extended the infected zone in that State. This confirmation is about 3 miles north of a 1938 confirmation located in the town of Minisink in the same county. The 10-mile protective zone surrounding the infected zone has been moved outward to include an additional 30.5 square miles. Another first record involves a tree found during elm-sanitation work at Upper Black Eddy, Bridgeton Township, Bucks County, Pa. This tree was within a mile circle of the confirmation found in Milford, N. J. The new point of infection increases the infected zone by 6.4 square miles.

Dutch elm work in swamps difficult.--Alternate freezing and thawing of swamp areas in which much of the work must be performed while the surface is frozen has considerably hampered the work during February. Thin ice and high water forced discontinuance of the work in some sections. In one swamp it was necessary to rush in and rush out as the receding and incoming water permitted. In another instance the crews built themselves a raft of logs from which to work. High water in the Delaware River also threatened to interfere with the work on several islands on which sanitation work is in progress.

Confirmations in beaver swamp.--Four Dutch elm disease cases were found during the month in a beaver swamp on the Sterling Mine property in the town of Warwick, Orange County, N. Y., approximately 1 mile north of the New Jersey State line. The trees were small and had been removed during the regular activities of sanitation crews engaged in removing dead and dying elms. The crews report that elm bark beetles are very plentiful in this swamp area.

Pennsylvania confirmations doubled.--Finding of 10 Dutch elm diseased trees in Pennsylvania during February doubled the number of confirmations thus far located in the State. Nine of the disease cases were found by elm-sanitation crews operated in Upper Makefield Township, Bucks County. The tenth tree was a first record in Bridgeton Township, in the same county.

Methyl bromide fumigant may revolutionize nursery practice to conform to Japanese beetle regulations.--Authorization on February 15 of methyl bromide as a fumigant for potted plants, plants in tubs, balled nursery stock and bare-rooted nursery stock marks the first time that research workers have found a satisfactory fumigant for this type of plant material. The absence of a satisfactory treatment for potted plants has been one of the major complaints of nurserymen and greenhousemen whose premises are infested by the Japanese beetle. The treating method provides that the nursery stock shall be fumigated with a dosage of $2\frac{1}{2}$ pounds of methyl bromide per 1,000 sq. ft., including the space occupied by the nursery stock, for a period of $2\frac{1}{2}$ hours, during which time the temperature of the soil and the air in the fumigation chamber shall not be lower than 63° F. The air-gas mixture must be circulated by means of a fan or blower throughout the entire period. A chamber completely lined with sheet metal is recommended. Advantages of this method are summarized in the following quotation from an article appearing in the March 1939 number of "Horticultural Topics," a publication of the New Jersey Association of Nurserymen: "New Jersey nurserymen should realize business to the extent of at least \$250,000 annually as a

result of the recently approved method of using methyl bromide for fumigating nursery stock to be shipped outside the Japanese beetle quarantined area, if the method proves as successful as information now available indicates. In making this prediction, Dr. C. C. Hamilton, of the State Agricultural Experiment Station, also pointed out that there will also be an actual saving of approximately \$75,000 in the treatment of plants. * * * Most of the necessary cooperative experimental work was done in New Jersey nurseries. 'Nurseries of the State participated in what is probably one of the most important steps yet taken in the development of better methods of treating nursery stock to be shipped outside the quarantined area,' Dr. Hamilton said. 'New Jersey nurserymen who utilize this method will benefit in three distinct ways: First, there should be a saving of from 3/4 cent to 2 1/2 cents per plant on the cleaning costs of deciduous trees and shrubs shipped without a soil ball. Second, there will be a decided saving in the treatment of balled nursery plants. In addition to being cheaper, the methyl bromide treatment appears safer than treatments with carbon disulphide emulsion or paradichlorobenzene. Third, the new method makes unnecessary the growing of nursery plants in soil treated with arsenate of lead. Heretofore, the cost of treating an acre of soil with lead arsenate has been approximately \$200. '"

Molding sand exempt in revised Japanese beetle regulations.--An important change in the Japanese beetle quarantine regulations, as revised effective February 20, was the exemption of molding sand from the certification requirements. This exemption was based on experimental work performed at the Moorestown, N. J., research laboratory. Tests showed that although Japanese beetle eggs will hatch in molding sand, larvae cannot survive. In New Jersey and several other districts this exemption released the services of several inspectors usually assigned to the supervision of molding-sand shipments and permits them to devote more time to nursery and greenhouse certification and other activities that have been short-handed.

Atlanta, Ga., soil treatments for Japanese beetle.--Lead arsenate applications in the section where 122 Japanese beetles were trapped in Atlanta last summer were started January 30 and completed February 15. A total of 15.8 acres was sprayed at the rate of 1,000 pounds of lead arsenate per acre.

Timber salvage increases gypsy moth inspection.--District inspectors stationed in the lumber areas of New England report that the timber felled by the hurricane of September 21, 1938, is being salvaged as fast as possible. The logs are being sledded or trucked from woodlots to waterholes, ponds, and lakes for storage, where they will be protected from borers until the mills can take care of the production. Many logs are being piled in open fields near woodlots, where portable mills are engaged in sawing the logs into square-edge lumber for sticking on the lots. It is thought that about 25 percent of the lumber can be absorbed by local markets during the current year. This hold-over will greatly increase the gypsy moth inspection of lumber for the next 2 or 3 years. It is estimated that over 50 percent of the pine timber in the affected region was felled by the hurricane.

Heavily infested lumber inspected.--Tops for the month in infested products inspected and certified for movement from the regulated area was a carload of lumber inspected at Rochester, N. H., for movement to Sparrows Point, Md. In the course of piece-by-piece inspection of the boards in the

shipment, 109 gypsy moth egg masses were removed. In addition, 24 egg masses were removed from 3 cords of birch fireplace logs, 13 from 2 carloads of lumber, 12 from 5 other shipments of forest products, and 1 egg cluster each from 5 shipments of mixed granite.

Gypsy moth inspection activities at Boston Sportsman's Show.--Twenty-five of one hundred and twenty-five exhibitors whose arriving exhibit material was checked at the Boston Sportsman's Show subsequently moved their stock to nonregulated territory under certification. Many of the exhibitors did not continue with their exhibits to the New York City show. Complete cooperation from the exhibitors and officials of the show aided inspection and certification of the products. Three inspectors were required for 1 day, to complete the inspections.

Gypsy moth infestation decreases in eastern Massachusetts.--According to general observations by the district inspector located at Middleboro, Mass., there is a considerable decrease, as compared to last year, in gypsy moth infestation in woodland areas adjacent to nurseries in eastern Massachusetts and the Cape Cod section.

FOREST INSECT INVESTIGATIONS

Western pine beetle invades isolated stands in Coast Range of California.--An outbreak in groups of thrifty, 90-year-old ponderosa pines has been found in the Los Posados State Park in Napa County, within 100 miles of San Francisco, according to K. A. Salman, Berkeley, Calif. Seldom have group infestations been found in the very few similar small, isolated stands in the bay region. Those stands are many miles distant from the extensive pine forests of the north Coast Range or of the Sierras, where heavy infestations can be expected.

High proportion of 1938 brood trees carry overwintering stages of western pine beetle.--R. C. Hall, Berkeley, reports that an analysis of data from 13 permanent sample plots on the Modoc National Forest, Calif., has shown that a high proportion of the ponderosa pine killed in 1938 will carry some stage of the western pine beetle over winter. Of the total volume killed, 67 percent was found to contain living brood in various developmental stages as late as the first week of November; 16 percent contained recent attacks; 15 percent, larval stages; 26 percent, a mixture of mature larvae and pupae; 10 percent, a mixture of pupae and adults; and 33 percent, abandoned cases. This is in addition to stages in trees which had not started to fade at the time of the late fall cruise. Also there has been a considerable increase in the number of trees and volume carrying overwintering stages in 1938, as compared to 1937 at approximately the same date. For the plots sampled, there are over 6 times as many trees and 3 times as much volume carrying brood in 1938 as in 1937. The condition in northern California appears to differ from that in Oregon and Washington, ^{1/} where a sharp drop occurred between the summer and winter generations.

^{1/} News Letter for November (vol. 6, no. 1, p. 8, Jan. 1, 1939).

The Prescott Matsucoccus scale on ponderosa pine.--Work on Matsucoccus vexillorum Morrison at Prescott, Ariz., has been carried on during the last two seasons by H. L. McKenzie, of the Berkeley, Calif., laboratory, to determine the seasonal history, effect of feeding on ponderosa pine, distribution, and relation of the scale to the so-called "twig blight." Histological studies indicate that the insect feeds from storage cells of the cortex area, and that there is an apparent internal break-down of cell contents, as well as cell-wall disintegration beneath aggregations of feeding Matsucoccus scales. Statistical work indicates the following: (1) Flagging, or fading of the twigs, is the result of a high population density of Matsucoccus scale; and (2) flagging is a contributing factor to the natural control of the scale insect, thus accounting for the fluctuations of flagging throughout successive years.

Matsucoccus scale infesting sugar pine in California.--In June 1936, G. R. Struble, Berkeley, observed and recorded scale infestations of Matsucoccus sp. on heavily flagged young sugar pines in the Yosemite region; however, no further work was done on the scale insect until the fall of 1938, when flagged and green branches were collected for study. H. L. McKenzie reports that preliminary work on this material indicates the following: (1) The scale, Matsucoccus sp., apparently prefers to settle principally on the main bole in the upper crown of the tree, although many were observed on the lateral branches. (2) On the main bole, they tend to congregate in large numbers under the bark scales about the nodes from which lateral branches arise, as well as around nodes on the branches themselves. (3) Where the scale settles in large numbers about these nodes there is a decided swelling of the nodes and also a copious flow of resin in the immediate vicinity of the insects. (4) This resin flow tends to "pitch out" the scale and also form a resin lesion where the branch arises from the node, and this lesion kills the branch. Nodes on lateral branches that are likewise heavily infested with scale insects may have lesions that ultimately kill the branch. (5) These flagged sugar pine branches may be confused with those commonly associated with blister rust.

A new pinon Matsucoccus in California.--On November 5, 1938, J. E. Patterson and S. T. Carlson, Berkeley, collected twigs from pinon pine (Pinus monophylla) near the Chuchupate ranger station on the Santa Barbara National Forest, Calif. These twigs were heavily infested with a new species of Matsucoccus (det. by H. Morrison). Approximately 320 acres of pinons showed evidences of heavy defoliation.

Peak losses from mountain pine beetle outbreak in lodgepole pine reached in 5 years.--Recent further analysis of survey data concerning the severe outbreak of the mountain pine beetle in lodgepole pine on the Beaverhead National Forest, Mont., indicates that approximately 5 years elapsed from the time the infestation invaded the area until peak losses were reached. When this outbreak developed in the vast lodgepole pine stands of the Beaverhead Forest it attacked the large, overmature, slowly growing trees, which are the most desirable host material and in which it multiplies rapidly. Such material, the merchantable, high-value timber of the forest, lasted for 5 years, but at the end of that time the average-sized tree available for attack was much smaller in diameter, faster growing, and more resistant to attack, the latter condition being reflected the following year in the higher

mortality of the attacking beetles and a decrease in the number of insects maturing and emerging. In 1932-33 unseasonably cold weather is believed to have been the cause of an abrupt decrease of this outbreak. Had the infestation run its normal course, the reduction noted in the sixth year of the outbreak would almost certainly have been followed by rapid decreases in subsequent years, as the diminishing broods were either forced to invade the remaining trees or to fly to areas containing more favorable host material.

Black Hills beetle epidemic reappears in Black Hills.--Not since the historic outbreak occurring in the Black Hills between 1895 and 1908, when from 1 to 2 billion board feet of ponderosa pine were killed, have the losses in this area been so great as they are at the present time, according to Dwight A. Hester, of the Fort Collins, Colo., laboratory. During the old epidemic the lack of information resulted in the infestation sweeping over and practically denuding the entire limestone region of the Black Hills. The present epidemic is being controlled simultaneously on Forest Service, National Park, and State Park lands, each organization taking care of its portion of the infestation. It is believed that this cooperation and combined treatment of between 10,000 and 12,000 infested trees will result in early suppression of the present outbreak.

New host records for some bark beetles.--In working over the scolytids collected from tree cages on limber, lodgepole, and ponderosa pine, in connection with studies on the biology of the Black Hills beetles in Wyoming and Colorado, Donald De Leon reports that several new host records have apparently been obtained. As some of the smaller species may possibly have worked their way through the 18-mesh wire used for the cages, not all of these records, especially of Pityophthorus, should be considered as conclusive evidence that the host given is the correct one. The hosts and the insects are listed below.

Insect	Host
<u>Carphoborus</u> sp.-----	<u>Pinus flexilis</u> James
<u>Hylurgops</u> <u>rugipennis</u> (Mann.)-----	do.
<u>H. lecontei</u> Sw.-----	do.
<u>Trypodendron</u> sp.-----	do.
<u>Ips integer</u> (Eich.)-----	do.
<u>I. guildi</u> Blkm.-----	do.
<u>Pityogenes</u> <u>hnechteli</u> Sw.-----	do.
<u>Pityophthorus</u> <u>murrayanae</u> Blkm.-----	do.
<u>P. caelator</u> Blkm.-----	do.
<u>Pityokteines</u> <u>minutus</u> Sw.-----	do.
Do.-----	<u>Pinus contorta</u> Loud.
<u>Pityophthorus</u> <u>caelator</u> Blkm.-----	do.
<u>Crypturgus</u> sp. (collected from roots)	<u>Pinus ponderosa</u> Lawson

Forest tent caterpillar eggs scarce in Minnesota.--R. H. Nagel reports that in January the Milwaukee, Wis., laboratory, in cooperation with the Forest Service, began the collection of data on the abundance and condition of forest tent caterpillar eggs on recreational areas of high value within

the Superior and Chippewa National Forests, Minn. The results so far tend to substantiate the prediction, made at the end of the 1938 season, that the infestation in 1939 will be unimportant from the National Forest recreational standpoint. Because of the cold and rainy weather conditions during May, comparatively few larvae of the heavy 1938 population survived the second instar. Of those remaining, a high percentage was killed during the late larval instars and the pupal stage by parasitic Hymenoptera and Diptera.

Abundance of bark beetles in weakened and dying elms.--D. E. Parker and W. C. Baker, of the Morristown, N. J., laboratory, have submitted a report that deals with the elm bark beetle infestation found in certain areas in Pennsylvania. In these plots elms growing within 1/2 mile of others that had previously been found to be affected with the Dutch elm disease were either pruned of all dead and dying wood, or were cut down and destroyed because they were considered 50 percent or more dead, this work being done by the Bureau's Dutch elm disease eradication unit. A total of 350 trees were pruned and 224 other trees were destroyed. The 350 pruned trees had an average of 1.98 square feet of bark area that had been attacked by elm bark beetles (Scolytus multistriatus Marsh. and Hylurgopinus rufipes Eich.). Of this area, 8.3 percent contained living bark-beetle brood. The 224 trees that were classed as dead and dying had an average of 12.36 square feet of bark area that the beetles had attacked. Of this, 14.5 percent contained living brood. The trees considered to be 50 percent or more dead accounted for 87.4 percent of infested bark area removed in the plots. S. multistriatus was more numerous than H. rufipes in the material examined.

Toxicity studies summarized.--S. F. Potts, of the New Haven, Conn., laboratory, has recently made a partial summary of data from toxicity studies conducted during the last 10 years on 22 forest- and shade-tree insects. Some of the highlights of these studies are as follows: The ratio of water to solid matter in the food and insect, and the pH of the food, were not found to be good indices of the Median Lethal Dose (M.L.D.) for insects when stomach poisons were used. Usually insects feeding on coniferous foliage required more inorganic poison for a M.L.D. than the same insects when feeding on foliage of broad-leaved trees. It is possible that the rosin present in the foliage of conifers interfered with the breaking down of the insecticide. In general, monophytophagous species were more susceptible to organic insecticides than polyphytophagous species. Decrease in toxicity of arsenicals was correlated with increase in fat content of the body. Since a larva may be twice as resistant to poison near the end of the last instar as at the beginning of this instar, it is necessary to determine the M.L.D. for the insect at the beginning and end of the last instar. The foliage of approximately 50 forest-tree species was found to be slightly acid (pH 4.2 to 5.6). The foliage of no tree species tested gave an alkaline reaction. Commercial brands of arsenicals having different particle size gave practically the same degree of toxicity. Insects that had unpoisoned food in their alimentary tracts were somewhat more resistant to stomach poisons than when their digestive tracts were empty. A laboratory method was developed for studying the toxicity of stomach poisons for (1) leaf-eating insects and (2) twig-boring forms. Another method was developed for measuring more accurately the effectiveness of insecticides against forest insects in the field. These methods have proved to be much more satisfactory than any previously used.

Factors influencing gypsy moth measured quantitatively.--H. A. Bess, New Haven, Conn., submits the following statement on gypsy moth ecological studies: "The second season's study on the influence of natural factors on the mortality and fluctuations in the population density of the gypsy moth, in areas where no artificial control measures are applied, gave encouraging results. The data obtained indicate that a large part of the mortality that occurred during the different stages of the insect could be measured quantitatively with considerable accuracy. From a careful examination of the dead insects, it was possible to determine in many instances the probable cause of death. During the larval period, which extends over a period of about 3 months, the mortality was measured daily. This procedure gave the daily fluctuations in the mortality rate and an opportunity to study more closely the probable influence of weather factors on these fluctuations. These quantitative data on the mortality caused by various factors, notably low winter temperatures and certain biotic factors, throughout the different developmental stages of the insect, have eliminated some of the difficulties encountered in attempting to evaluate the effectiveness of these factors from data that gave only the percentage of the population affected by certain factors (i.e., parasites) on particular dates throughout the season."

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Adverse weather retards gypsy moth work.--Much time was lost because of stormy weather during the first half of February in all localities where Federal W. P. A. gypsy moth work is being conducted and progress in scouting and burning work was seriously retarded. By the middle of February it was necessary for gypsy moth crews to use snowshoes only on the high elevations in Vermont and in the Berkshire Mountains in Massachusetts. Continued unfavorable conditions during the rest of the month greatly hampered scouting work, but provided an opportunity for the disposal of considerable brush that had accumulated in infested localities where ground work and selective thinning had been recently done.

Eligibility and citizenship of all W. P. A. gypsy moth workers checked.--The W. P. A. Division of Intake and Certification is at present reviewing the relief eligibility status of all workers assigned to duty on W. P. A. projects, and arrangements are being made with the supervisory personnel of this project so that all of the workers assigned to W. P. A. gypsy moth work may be reinterviewed before the end of March. Also, during the last week in February, citizenship affidavits were obtained from all W. P. A. workers employed by this Bureau, with the exception of those absent from duty because of injury, sickness, or personal reasons. Any W. P. A. worker whose affidavit, properly executed, has not been submitted prior to March 5 will not be permitted to perform service after that date. Those workers who are not citizens or who do not owe their allegiance to the United States will be dropped from the work on February 28.

Several small infestations found within barrier zone.--Three additional gypsy moth infestations have recently been located in the town of Ripton, Addison County, Vt., within the barrier zone. A total of nine colonies have been found in Ripton to date. These infestations were established by wind-spread of the small caterpillars last spring from an infestation to the east of the zone. Two infestations have been located in the adjoining barrier zone

town of Goshen, seven in Granville, and two in Hancock, all established through the same source. All of these colonies are small, most of them consisting of a single egg cluster.

Small infestations found near barrier zone in Massachusetts.--Nineteen gypsy moth infestations have been discovered in Plainfield, Mass., since scouting was begun in that town on December 19, 1938. Most of the infestations consisted of only 1 egg cluster, which indicates clearly that they were established by windspread last spring. All other infestations found in that town to date are small and were undoubtedly established as a result of windspread in the spring of 1937. Plainfield is just outside the barrier zone area and borders Windsor, which is within the barrier zone.

Cordwood from private estates given to poor families.--The agent stationed at Glen Head, Long Island, N. Y., has recently spent a considerable part of his time inspecting cordwood in preparation for its removal from private estates in that part of Nassau County which is regulated on account of the gypsy moth. For the most part, this wood was cut by needy families to whom the wood was given on condition that the brush be disposed of as the cutting progressed.

Scouting work completed on powder company property.--Gypsy moth scouting work on the property of the Dupont Powder Company, situated in the township of Pittston and extending into the township of Lackawanna, Pa., was completed on February 11. All egg clusters found were creosoted, but burlapping, and possibly spraying, will be necessary next spring in order to eradicate the infestation.

Efficient barbwire rewinder developed by gypsy moth employees.--Recently, while Government employees were removing approximately 52,000 lineal feet of barbwire used in connection with the spraying of an isolated gypsy moth infestation found in Damascus Township, Wayne County, Pa., during the fiscal year 1938, the property owners became greatly interested in the apparatus developed by this project for rewinding barbwire onto reels. The machine consists of a frame made of angle iron with a removable iron bar for inserting and removing the reels. A crank handle works a system of gears and exerts a very strong pull on the wire. The apparatus is portable, is easily anchored where needed, and has a guide for winding the wire evenly on the reels. This device does the work required efficiently and saves considerable labor. It is used in connection with reels made of heavy wire which are light, strong, and demountable, and which can be purchased at a low cost.

Railroad lines and sidings mapped in Pennsylvania.--A regular employee of this project has recently been detailed to map all railroad sidings located within the area under quarantine on account of the gypsy moth in Pennsylvania. This information will be useful in making periodic inspections of sidings and in checking the movements of railroad equipment likely to harbor gypsy moth infestations. Main railroad lines will also be correctly located on scout maps, which are used by the crews in the field, so that a composite railroad map of the quarantined area may be prepared when the survey is completed.

Unusual shipment inspected for gypsy moth.--In that area in Pennsylvania which is under State quarantine on account of the gypsy moth, 2,749

shipments were inspected and certified and 3,102 shipments were moved under permit during the month of January. In connection with this work, 11 new gypsy moth egg clusters were found and destroyed at the point of origin. Among the materials inspected were approximately 500 mine sprags, which are wooden pins about 2 feet in length and 3 inches in thickness, and tapered to a point at each end. They are thrust into the openings of car wheels and used as brakes by the workmen when they wish to retard or stop the mine cars. This is the first inspection of sprags reported since work was begun in Pennsylvania in 1932.

C. C. C. gypsy moth work progressing on greatly reduced scale.--Fire-hazard-reduction work is still taking much time that had been planned for C. C. C. gypsy moth work. For the week ended February 11, 1939, 736 6-hour man-days were used on C. C. C. gypsy moth work under the supervision of this Bureau, while 2,017 man-days that normally would have been used on gypsy moth work were diverted to fire-hazard-reduction work. Approximately 37,500 6-hour man-days had been taken from gypsy moth work and used on emergency work up to February 11. Most of the gypsy moth work consisted of selective thinning and burning brush and debris, although some time was spent in training men for climbing work with ropes and ladders. This work will be pushed as rapidly as possible on days when the trees are free from snow and ice.

PLANT DISEASE CONTROL

Different crew formation given trial in Michigan.--F. B. Powers, State leader in charge of barberry eradication in Michigan, reports that during the winter months a slight deviation from the usual method of strip scouting of timbered areas has been tried. As in the past, the distance between workers in crews of from 8 to 10 men is gauged according to the density of vegetation in the territory being covered. Rather than working abreast, however, the second worker starts after the guide has advanced about 6 to 10 paces, the next after the second advances 6 to 10 paces, and so along the line. Instead of each worker searching the ground on both sides of him, the usual procedure, he covers only that portion between him and the man whom he is guiding. Preliminary results indicate that the men maintain better intervals, converse less with their neighbors, and appear to miss fewer bushes in crews where this procedure has been adopted.

Barberry eradication in Missouri since 1935.--In a letter sent to all men who since 1935 have been employed in connection with the barberry-eradication program in Missouri, George M. Frandsen, State leader in charge, points out that 18,500 barberry bushes have been destroyed as a result of a detailed inspection of about 1,700 square miles in the northern part of the State; 24 counties have been completed and some work has been done in 14 additional counties; and barberry bushes have been found on a total of 1,180 properties.

State W. P. A. program supplements Federal program in Minnesota.--In December 1938 the Minnesota Works Progress Administration approved a State program to supplement work that is being done with Federal project funds. The supplemental program provides for 910 man-months of employment. According to L. W. Melander, State leader in charge, trained and experienced men have been retained as supervisors in connection with the State program and

crews have been organized in a manner similar to those paid with Federal funds. The same degree of efficiency is expected.

Blister rust damage.--C. C. Perry, State blister rust leader for Massachusetts, has prepared the following table to show blister rust conditions in the Crane infection plot at present, as compared with the situation at the time this study plot was established in 1923. The plot is located in Ipswich, Mass.

Item	: 1923	: 1938
	: <u>Number</u>	: <u>Number</u>
Healthy pines-----	: 36	: 45
Pines that will die-----	: 102	: 7
Pines that will recover-----	: 4	: 0
Dead pines-----	: 1	: 91
Live cankers-----	: 1,089	: 8

The increase in the number of healthy trees arises, of course, from the fact that some pines originally classed among those that would die, actually recovered through the failure of branch cankers to reach the trunk. It will be noted from these figures that a condition of stability has been reached in this stand. There are only 7 pines that have active cankers, and it is not certain that all of these cankers are still functioning. The eradication of wild Ribes on the Crane Estate was completed during the course of initial work in August 1923 before the establishment of the study plot was even contemplated. For that reason no data are available to definitely show the number of wild Ribes actually on the plot or within a contiguous protection zone. However, on the 75 acres in the block (Tilton Hill) where the plot is located the crew found and destroyed 2,076 wild gooseberries (Ribes hirtellum) and 506 escaped red currants (R. sativum hybridi). These bushes were old plants of optimum size and the leaves were heavily infected. Most of the bushes were found growing along stone walls. There were no cultivated Ribes on Tilton Hill, but many Ribes were under cultivation northeast of the plot at a point approximately 2,000 feet from the plot. In August 1923, 12 large European black currants (Ribes nigrum) were eradicated and in September of the same year 85 red currants, 36 cultivated gooseberries, and 3 flowering currants were also destroyed. It has always been questionable whether influence of the wild Ribes was sufficient to cause the damage on this plot. There has been an inclination to infer that conditions, especially fog, may have been so favorable that sporidia from the large patch of cultivated Ribes may have been responsible for some of the infection. Since 1923, there has been a slight recurrence of R. hirtellum on Tilton Hill and actually in the plot. These recurring Ribes, however, have been extremely weak specimens and have apparently failed to cause infection on the plot, as no cankers originating since 1922 have ever been noted.

Spread of blister rust.--In Virginia blister rust infections were found on white pines at three new locations in Rockingham County. In Ohio infection on white pine was found for the first time in Cuyahoga County on January 9. Only one infected pine was found. Infected Ribes nigrum and R. rubrum were found within 100 feet of this pine in 1934.

COTTON INSECT INVESTIGATIONS

Effectiveness of insecticides against three cotton insects.--The efficacy of several insecticides and mixtures of insecticides against the boll weevil, the cotton leaf worm, and the tarnished plant bug was tested in 1938 at Tallulah, La., by G. L. Smith, A. L. Scales, and R. C. Gaines. The tests against the boll weevil and tarnished plant bug were on caged cotton plants out of doors and those with the leaf worm were laboratory tests with fifth-instar larvae by a modified sandwich method. Fourteen brands of commercial calcium arsenate were used in the tests against the boll weevil and the leaf worm. In 1937 the coefficient of correlation between the percentage of water-soluble As_2O_5 by the New York method and net mortality of boll weevils was significant, and in 1938 highly significant. There also appears to be considerable relation between water-soluble As_2O_5 and net mortality of the cotton leaf worm, the samples having the highest water-soluble As_2O_5 usually causing the highest mortalities and those containing low water-soluble As_2O_5 causing somewhat lower mortalities. The dosages required to kill 50, 95, and 99 percent of the fifth-instar leaf worms were determined and, in general, the smallest dosages were required for the calcium arsenates containing high percentages of water-soluble As_2O_5 and the largest dosages were required for the calcium arsenate containing a low percentage, with the intermediate falling between the low and high. Tests were also made against the boll weevil and cotton leaf worm with three commercial calcium arsenates and with four fractions of each of three calcium arsenates obtained by means of a centrifugal air separator by the Division of Insecticide Investigations. The fractions differed in particle-size distribution and there was also considerable chemical difference in the fractions obtained from the calcium arsenate with high and medium water-soluble As_2O_5 by the New York method and only slight chemical difference in the fractions made from the calcium arsenate low in As_2O_5 . In general, the fractions containing particles of largest average size also had the highest percentages of water soluble As_2O_5 by the New York method and were most effective against the boll weevil and cotton leaf worm, and the fractions with the finest particles contained the least water-soluble As_2O_5 and were the least effective. In other tests against the boll weevil a practically pure di-calcium arsenate caused a significantly higher mortality than two basic calcium arsenates and a commercial calcium arsenate. A mixture of equal parts of calcium arsenate and sulphur, and a mixture of one part of calcium arsenate to three parts of sulphur caused a slightly lower mortality of boll weevils than the calcium arsenate, but the differences were not significant. Nicotine bentonite and mixtures of nicotine bentonite and tannate caused significantly lower mortalities than any of the calcium arsenates tested. The addition of from 0.3 to 1.0 percent of wetting agents (Aresket 300, Areskap 100, and Vatsol-OS) to commercial calcium arsenate did not increase or decrease significantly the net mortality of boll weevils and cotton leaf worms. Three cryolites containing from 70 to 91 percent sodium fluoaluminat caused significantly lower mortalities of boll weevils than did calcium arsenate, and the cotton leaf worm mortalities were also somewhat lower with the cryolites. The addition of the above-mentioned wetting agents to the cryolite did not appear to materially change the effectiveness of the original samples. In tests against adults of the tarnished plant bug, derris containing 4.3 percent rotenone was only slightly more effective than when diluted with sulfur to contain approximately 1 percent rotenone, while both the derris and the derris-sulfur

mixture were more effective than sulfur alone. The addition of wetting agents to the derris, sulfur, and derris-sulfur mixture did not materially affect the net mortality.

Control of boll weevil with calcium arsenates containing different percentages of water-soluble arsenic pentoxide.--A series of 7 tests using calcium arsenates containing high, intermediate, and low water-soluble As_2O_5 by the New York method for boll weevil control, conducted at 6 stations of this Division and one test by the Texas Agricultural Experiment Station last season have been reported by R. C. Gaines of Tallulah, La. Tests were made at Florence, S. C., by F. F. Bondy and C. F. Rainwater; at Gainesville, Fla., by C. S. Rude; at State College, Miss., by R. L. McGarr; at Tallulah, La., by R. C. Gaines and M. T. Young; at Port Lavaca, Tex., by K. P. Ewing; and at College Station, Tex., by R. W. Moreland and by J. C. Gaines of the Texas Experiment Station. Two tests were conducted by the Bureau at College Station, making a total of 8 tests. Plots of 1/30 acre were arranged in blocks selected at random and each treatment was replicated from 4 to 7 times in each locality, making a total of 45 replications. Treatments consisted of dusting with calcium arsenates containing on an average 0.5, 4.6, and 10.3 percent of water-soluble As_2O_5 , as determined by the New York method. The low and intermediate calcium arsenates contained an average of 43.5 percent of total arsenic pentoxide, and the high 45.5 percent. The calcium arsenates were applied with hand dust guns at the rate of 5.4 to 6.9 pounds per acre at 5-day intervals, beginning when 10 percent of the squares were punctured. Analyses of variance of infestations and of yields were made at all localities with the checks included and also with the checks omitted. The infestation records, observed in percentages, were also transformed to equivalent angles for use in the analysis of variance. When the checks were included in the analyses the difference between treatment infestations and treatment yields were highly significant. When the checks were not included these differences were not significant. The conclusions regarding treatment infestations from the analyses using equivalent angles were identical to those using percentages. In other words, there was no significant difference between different calcium arsenates containing low, intermediate, and high water-soluble arsenic pentoxide by the New York method. The only significant differences were between poison treatments and the untreated checks.

Winter mortality of pink bollworm larvae.--A. J. Chapman, of the Presidio, Tex., laboratory, reports the results of the monthly examinations to determine the progressive winter mortality of pink bollworm larvae in bolls on the plants and in bolls on the surface of the soil for the last 2 years as shown in the following table.

Treatment	Mortality in--					
	December		January		February	
	1937	1938	1937	1938	1937	1938
	Percent	Percent	Percent	Percent	Percent	Percent
Bolls on plants-----	13.00	8.81	18.05	26.01	25.09	35.63
Bolls on soil surface--	16.20	27.51	12.26	34.01	42.85	32.38
Average-----	15.05	18.16	15.15	30.01	33.97	34.00

It can be seen from this table that the average mortality, as shown by the final examination in February, was about the same for both years. The

minimum temperature for the 2 years was the same, 18° F. The mean minimum temperature was much lower this year than last. There was a total of 492 hours below freezing this year, as compared to 134 hours last year. The percentage of mortality was obtained by examining at the end of each month 300 bolls attached to plants and 300 bolls placed on the surface of the soil in November. The average number of worms per boll had been determined by examination of a large sample of bolls at the beginning of the experiment early in November.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Autogiro survey of wild cotton in southern Florida.--The autogiro survey work, which was begun in southern Florida early in February, was continued throughout the month. After general observation flights were made, a survey was first made over the Cape Sable area. During these flights no new colonies of wild cotton were found; however, a good many stray plants were noted. Approximately 350 wild cotton plants were located from the air and destroyed as a result of the survey of this area. These plants appeared to be 2 or 3 years old and were no doubt the result of seed disseminated by the 1935 hurricane. After the Cape Sable area was completed, flights were made over the Ten Thousand Islands section. Several hammocks heretofore not worked were located in the lower part of this section and wild cotton plants on one of the hammocks were plainly visible from the autogiro. One or two small hammocks were spotted deep in the mangrove swamp. The exact locations of these hammocks were indicated on a map of the section so that crews could scout then later for wild cotton plants. The last observations were made from Everglades to Fort Myers and over various islands and the shore line of Charlotte Harbor. No new wild cotton locations were found during these flights but some new possible locations were observed. The inspector in charge of the work in this particular area estimates that the autogiro flights saved 2 or 3 weeks' scouting with a crew of men. The aerial survey for the entire area was completed on March 7.

Field clean-up in pink bollworm infested area of Salt River Valley.--Field clean-up in the area east of Gilbert, Ariz., which has been in progress for the last several months, was practically completed at the close of March 10, when the last two labor crews were dismissed. Cleaning of 3,110 acres had been completed at the end of the campaign. Weather and field conditions improved considerably during the last few weeks, and much better headway was made in all phases of the work than when operations were first started. Ground material could be burned readily after being raked into windrows, eliminating the process of piling it on the stalk piles to dry. The hard, dry state of the ground expedited the progress of cutting stalks with the sled cutters, as the knives did more effective work under these conditions. Some stub cotton remains to be destroyed in the area but this work is under way and should be completed within a short time.

Thurberia-plant eradication in Arizona.--The W. P. A. camp of laborers engaged in destroying Thurberia plants in southern Arizona is being moved from Ventana Canyon, in the Santa Catalina Mountains, to a location near the Continental Ranch, just west of the Tucson-Nogales Highway. Arrangements have been made for an adequate supply of water from the main well of the Continental Ranch. A few plants have been removed from areas nearest the

cultivated cotton produced in the vicinity of Continental and Sahuarita. Up to this time *Thurberia* weevil infestation in bolls from these plants has been negligible. During the month of February the crews covered 12,900 acres of ground and a total of 53,038 *Thurberia* plants were located and destroyed.

Laboratory inspection of green cotton bolls.--During the fall months a large quantity of green bolls from the 1938 cotton crop were collected from counties in Texas, Oklahoma, and other States, to be examined for pink bollworm infestation at the San Antonio, Tex., laboratory during the winter and spring months. These bolls were collected from areas near regions known to be infested with the pink bollworm, and from other areas in which little or no gin-trash inspection was made during the last season. As these bolls are collected they are placed in metal drums of 15-gallon capacity, in a solution of zinc sulfate, which serves as a preservative. Bolls placed in this solution remain green and in perfect condition for an indefinite period. The inspection of this material was begun in December and is being carried on at this time. During the period a large number of sea-island cotton-boll samples from southern Georgia and northern Florida have been examined, with negative results as to pink bollworm infestation. A small amount of material, collected from several fields north of Allende, Coahuila, Mexico, was inspected in the laboratory early in the season, resulting in the finding of several specimens of the pink bollworm. Examination of bolls collected from plantings on the American side, nearest this infestation, followed immediately but there were no indications of the presence of pink bollworms in this material. Inspectors have recently completed the inspection of several hundreds of boll samples from southwestern Oklahoma and are now engaged in the examination of bolls from Refugio, Calhoun, Victoria, and other coastal counties of Texas.

Planting in the quarantined areas of southern Texas.--Planting of the 1939 crop in the lower Rio Grande Valley district and the Coastal Bend district, where initial pink bollworm infestations were discovered in 1936 and 1938, respectively, is now well under way. Owing to climatic conditions, planting can be started in these areas earlier than in other sections of Texas. Several plantings were reported early in February but, owing to unusually cold weather prevailing at that time, germination was extremely poor and cotton came up to only a fair stand. This cotton has made very little progress. We are accordingly informed that approximately 230,000 acres will be planted to cotton this coming season in the lower Rio Grande Valley district and around 200,000 acres in the Coastal Bend district. At the close of February it was estimated that approximately 50 percent of the entire cotton acreage in the area had been planted.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Protection of tobacco bulks against tobacco moth.--W. D. Reed and J. P. Vinzant, of the Richmond, Va., laboratory, report that experiments conducted during the fall of 1938 demonstrated that bulks of tobacco could be protected against infestation by *Ephestia elutella* Hbn. by covering these bulks with plant-bed cloth in open warehouses or by using the tobacco-plant-bed cloth as a covering over bulks of tobacco in growers' packhouses, supplemented by weekly applications of pyrethrum powder directed against the

adult moths. In the experiment in an open-storage warehouse an examination of the bulks protected by the tobacco-plant-bed cloth showed that there was a reduction of approximately 99 percent in the hands of tobacco thus protected, as compared to tobacco bulks exposed to infestation by the tobacco moth. Only a trace of infestation was found in tobacco bulks present in a grower's packhouse which had been protected by plant-bed cloth during the time when the adults of E. elutella were present in the packhouse, supplemented by weekly dustings with pyrethrum powder. In each experiment the tobacco-plant-bed cloth was removed weekly and treated to destroy the tobacco moth eggs that had been deposited thereon.

Resistance of certain plants to the pepper weevil.--According to observations made by J. C. Elmore, of the Alhambra, Calif., laboratory, there appears to be a chance to avoid severe injury by Anthonomus eugenii Cano and the harmful residues which often result from insecticide applications to control this pest, by developing a strain of pepper plants resistant to or tolerant of the weevil. During the course of field observations extending over several years in southern California it has been apparent that certain pepper plants produce a fair crop of peppers, notwithstanding attack by the weevil, particularly those plants that set their pods early and mature to a point where they can be harvested before the weevils become sufficiently abundant to cause severe damage. On the other hand, the pods produced late in the season on plants of apparently the same variety of peppers, intermingled with the resistant variety, are subject to severe attack by the pepper weevil, with resultant loss to the grower. In other instances certain of the resistant plants may produce 30 or 40 pods, while the nonresistant may have only 1 or 2 pods or possibly none, and those produced are usually injured severely. The cause of this apparent resistance has not been ascertained, although it is possible that it may be attributable to early nativity, rapidity of growth, or some physiological factor.

Kernels of corn and wheat superior to legume seeds or yeast as food for wireworms.--C. E. Woodworth, of the Walla Walla, Wash., laboratory, reports that during the 4-month period ended March 1, larvae of the sugar beet wireworm (Limonius californicus (Mann.)) and of the Pacific coast wireworm (Limonius canus (Lec.)) have been kept on 11 different diets in order to determine the effect of such diets upon their weight and growth. During this period the various food combinations have continued to demonstrate very clearly their relative nutritional value. It has been found that the starchy foods, such as corn and wheat, are by far the best of the foods supplied. These 2 foods are superior to the others in the group, whether fed in sterilized or unsterilized form. Wheat has proved to be slightly superior to corn when the former is sprouted before being fed, although corn has shown itself superior to wheat after the former has been cooked for a short time. Of the legumes, the seeds of peas are generally better than those of beans, although lima beans are in general better food for wireworm larvae than are navy beans. Larvae fed uncooked beans have made greater gains in weight and growth than those fed cooked beans. In these tests yeast undiluted has proved to be a very poor food for wireworm larvae, evidencing its lack of proper nutritional values for this insect by the death of approximately 85 percent of the test insects and a pronounced loss in weight to the surviving individuals at the expiration of a 4-month period.

Control of joint infestation of Mexican bean beetle and corn ear worm on lima beans.--In summarizing the results of an experiment conducted on Fordhook lima beans at Norfolk, Va., late in the summer and early in the autumn of 1938, L. W. Brannon reports that dust mixtures or sprays containing cryolite controlled successfully an infestation of Epilachna varivestis (Muls.) in association with Heliothis obsoleta (F.). The cryolite-dust mixtures consisted of 60 parts of cryolite to 40 parts of sulfur or of talc, by weight. The cryolite sprays were made up at the rate of 3 pounds of cryolite to 50 gallons of water. Cryolite dusts and sprays increased the yield approximately 70 percent, as compared to the check, whereas plots to which sprays of derris or cube had been applied showed yield increases ranging from 30 to 40 percent. In view of the fact that the Mexican bean beetle infestation in the field where the experiment was staged was not unusually severe, the larger yield increases from the use of cryolite were attributed principally to the superior effectiveness of this material against the corn ear worm, since previous experiments have demonstrated that derris and cube are of very little value against this pest. This is borne out by the fact that examinations of wormy and uninjured pods from one series of the plots where a cryolite-talc mixture had been applied and from the untreated plots showed that the insecticide treatments resulted in a reduction of 30 percent in wormy pods per plot at harvest, as well as in an increase of 65 percent in the number of pods produced per plot, as compared to the untreated plots. Previous experiments with the corn ear worm on lima beans had shown that when it attacks young or immature pods many of them drop from the plants, contributing greatly to the reduction in yield ordinarily caused by the ravages of this insect.

FOREIGN PLANT QUARANTINES

Methyl bromide not effective for lima bean scab.--A report dated February 21, 1939, from Anna E. Jenkins, of the Bureau of Plant Industry, indicates that the methyl bromide treatment which seems to eliminate Maruca testulalis (Geyer) from lima beans is not effective for the lima bean scab (Elsinoe phaseoli Jenkins). Diseased pods from lots treated at New York for M. testulalis and later placed in moist chambers showed the same amount of growth of the fungus as the checks. Pure cultures of E. phaseoli in test tubes and petri dishes, whether given a dosage of 4 pounds or of 6 pounds for 90 minutes while open, showed no checking of growth of the pathogen in comparison with the checks. These treatments were given in Washington on February 6 by R. Latta, who is carrying on experimental work with the treatment.

Pink bollworm intercepted in the mail.--On February 7 two living larvae of Pectinophora gossypiella Saund. were taken at New York from an immature cotton boll found among some green herbs (tea bushes) in the mail from Jamaica. This is our first record of the interception of this insect from that country. On February 16 three living larvae of the pink bollworm were intercepted at New York in mail from England. The infested cottonseed were found in a small wad of seed cotton which had been used as packing for earrings.

Hornets imported with bananas.---While inspecting a trainload of bananas at El Paso on the night of November 24, 1938, Inspector A. K. Pettit observed what appeared to be a large russet fruit hanging from one of the side walls in an ice bunker. Closer inspection revealed the supposed fruit to be a nest of small hornets. Fortunately, the temperature was below freezing and the insects were so chilled that they offered no resistance and Mr. Pettit was able to remove the nest intact. The hornets proved to be Polybia occidentalis, a species not reported as occurring in the United States. It is recorded as being present in Brazil, Ecuador, British Guiana, and the Panama Canal Zone.

Asiatic rice borer found in hog food.---The German SS Spreewald arrived in New Orleans with two pigs on board. An examination of the pigs' food disclosed 400 pounds of rough rice with stems attached, which was approximately 90 percent infested with living larvae of the rice stem borer (Chilo simplex Butl.). The rice and stems were purchased in the Philippine Islands.

Packing of exhibits for Golden Gate International Exposition.---In connection with the finding and disposition of prohibited foreign materials, inspectors have been kept busy during the past month supervising the removal and destruction of prohibited rice-straw packing concerned with exhibit material arriving from various foreign countries, consigned to the Golden Gate Exposition at San Francisco. Many of these cases contained priceless wares and porcelains, requiring very careful handling and therefore involving an unusual number of man-hours of supervision.. To date, nearly 1/2 ton of such packing, taken from a total of 293 cases, has been removed and destroyed under proper safeguards. The shipments concerned originated in Straits Settlements, Java, Japan, China, and Indo-China. Shippers and consignees are co-operating fully in the handling of these shipments.

Species of Bruchus and Apion intercepted in vetch seed.---The following species of Apion and Bruchus have been intercepted in vetch seed from various foreign countries. Many of these interceptions were made in vetch which contaminated straw jackets used on imported liquors.

Insect	:	Country of origin
<i>Apion abruptum</i> Sharp-----	:	Japan
<i>Apion cerdo</i> Gerst.-----	:	Spain, Union of Soviet Socialist Republics
<i>Apion cracca</i> (L.)-----	:	England, Germany, Poland, Scotland
<i>Apion ochropus</i> Germ.-----	:	France
<i>Apion pomonae</i> (F.)-----	:	Belgium, England, France, Germany, Ireland, Italy, Netherlands, Poland, Portugal, Scotland
<i>Bruchus altaicus</i> Fahr.-----	:	Turkestan
<i>Bruchus atomarius</i> (L.)-----	:	Germany, Union of Soviet Socialist Republics
<i>Bruchus brachialis</i> Fahr.-----	:	Czechoslovakia, France, Germany, Hungary, Italy, Netherlands, Pales- tine, Spain
<i>Bruchus dentipes ochraceosig-</i> <i>natus</i> Heyden-----	:	Union of Soviet Socialist Republics
<i>Bruchus emarginatus</i> Allard----	:	France
<i>Bruchus hamatus</i> Miller-----	:	Turkey
<i>Bruchus laticollis</i> Boh.-----	:	France, Italy
<i>Bruchus luteicornis</i> Ill.-----	:	Belgium, England, France, Cuba, Hungary, Italy, Netherlands, Scotland
<i>Bruchus rufipes</i> Hbst.-----	:	Czechoslovakia, England, France, Ger- many, Hungary, Italy, Netherlands, Poland, Portugal, Scotland, Switzer- land, Union of Soviet Socialist Republics
<i>Bruchus tristiculus</i> Fahr.-----	:	Hungary, Italy, Morocco
<i>Bruchus tristis</i> Boh.-----	:	Italy
<i>Bruchus vicine</i> Oliv.-----	:	Czechoslovakia, Germany, Hungary, Italy

Entomological interceptions of interest.---Two larvae of the fruitfly *Anastrepha fraterculus* (Wied.) were intercepted at Jacksonville, Fla., on October 19, 1938, in an orange in ship's stores from Brazil. Seven living larvae of the Mediterranean fruitfly (*Ceratitidis capitata* Wied.) were intercepted at San Pedro, Calif., on November 2, 1938, in two figs in ship's quarters from Hawaii. The infested figs were found in a waste basket. A living specimen of the mango weevil (*Sternonchetus mangiferae* F.) was taken at Boston on November 13, 1938, in a mango fruit in ship's stores from the Union of South Africa. Living specimens of the coccid *Lichtensia lutea* (Oell.) arrived at Hidalgo, Tex., on November 12, 1938, on a croton plant in baggage from Mexico. A living adult of the weevil *Apion ononicola* Bach was intercepted at New York on November 16, 1938, on a white turnip leaf in ship's stores from France. A living specimen of the acridid *Opshomala vitreipennis* (Marshall) was found on November 13, 1938, at the airport at Brownsville, Tex., on a gardenia in cargo from Mexico. Pupal fragments of the pink bollworm (*Pectinophora gossypiella* Saund.) were taken at Chicago, Ill., on November 14, 1938, in cottonseed in the mail from St. Kitts, British West Indies. Adults of the tenebrionid *Liodema kirschi* Bates arrived at New Orleans on November 14, 1938, under the bark of a cedar log in

cargo from Honduras. Specimens of the scale insect Aspidiotus lenticularis Ldgr. were intercepted at Washington, D. C., on September 9, 1937, on a hazel tree in the mail from Italy. Living specimens of the whitefly Trialeurodes varia Quaintance and Baker were taken at Nogales October 30, 1938 on a geranium leaf in baggage from Mexico. A living larva of the yam weevil (Palaeopus costicollis Marsh.) was intercepted at Honolulu, T. H., on May 13, 1938, in a yam (Dioscorea sp.) in baggage from the Philippines.

Pathological interceptions of interest.--Ascochyta vodakii Bub. was intercepted on December 6, 1938, at New York in a shipment of Hepatica acutiloba from Poland. Ascochyta grossulariae Died. was intercepted at New York on January 20, on Ribes grossularia cuttings in baggage from Germany. Cercospora lantanae Chupp was intercepted on cuttings of Lantana canara in baggage from Bermuda on February 10, at New York. Cercospora sp. was found on convolvulus leaves on the landing gear of an airplane from the American Virgin Islands on December 14, 1938, at San Juan. Cercospora sp., no species reported on host, was intercepted at Brownsville on January 1, in mail from Mexico at the airport. Elsinoe australis Bitancourt and Jenkins was found at Philadelphia on July 5, 1938, on an orange from Brazil. Gymnosporangium sp. was found on a mountain ash berry in a shipment from Poland on January 31 at New York. The species of Gymnosporangium occurring on Sorbus in Europe are not reported on fruit but on leaves only. A husk tomato fruit intercepted at El Paso on February 10, was spotted with a gray feltlike growth resembling that of Helminthosporium sp. which has been intercepted on tomatoes. Heterosporium echinulatum (Berk.) Oke. was intercepted on carnation leaves from British Columbia on February 23 at Seattle. Phyllosticta hibisci Pk. was intercepted on January 27 at New York on the leaves of hibiscus cuttings in baggage from Bermuda. A Phyllosticta found on Camellia japonica plants from Japan offered for entry under special permit at San Francisco was determined as possibly P. camelliaeicola var. meranensis Bubak reported from Austria. Ustilago vailantii Tul., with spores smaller than the description calls for, was found in flowers of a shipment of cipollino bulbs from Morocco.

DOMESTIC PLANT QUARANTINES

Changes in project leaderships.--Claude Wakeland, who since March 1938 has directed Mormon cricket control activities under the supervision of the Division of Domestic Plant Quarantines, has been designated field director of both Mormon cricket and grasshopper control activities. R. A. Roberts, who was assistant project leader on the Mormon cricket work in 1938, has been selected to succeed Mr. Wakeland. W. E. Dove will continue as project leader of grasshopper control in the same capacity as in 1938. A field director for both projects is considered necessary because of the extensiveness of the area, the magnitude of these projects, and the complex problems involved, which require careful study and frequent conferences of an emergency nature between Federal and State cooperating officials concerning which prompt decision and action are required. The project leaders, because of the multiplicity of administrative responsibilities, cannot devote sufficient time to an analysis of the many field problems encountered in the execution of so large a program. This is particularly true of grasshopper control.

Grasshopper control activities.--Preliminary arrangements are being made for grasshopper baiting operations in the approaching season pending actual appropriation for the control work. Organizational and educational meetings are being carried on and, as rapidly as possible, the programs are being worked out with State and county leaders so that plans will be complete in all areas as soon as baiting is practicable. Plans are being made to cooperate with farmers and State agencies to control grasshoppers on idle and nonresident land from which destructive flights of these insects are expected. To carry out these broad-scale operations large numbers of mechanical bait spreaders will be needed throughout the season. For the construction and assembling of these spreaders, several thousand sets of drawings and instructions are being provided to State leaders and county agents for distribution throughout the infested region. Those efforts are being supplemented by those of two agricultural associations of the Northwest and by railroad companies, in assisting in locating adequate local storage for advance shipments of bait materials and in urging the construction of a sufficient number of bait spreaders.

Railroads exhibit grasshopper control.--Traveling institutes containing exhibits on grasshopper control are being operated throughout Minnesota, North Dakota, and South Dakota by two railroad companies of that region. Federal and State grasshopper control workers are participating in these institutes which are attended by crowds of from 500 to 1,000 persons daily.

Storage facilities for grasshopper bait to be increased.--In addition to obtaining local storage in each county for materials to be used in baiting grasshoppers in any operations conducted this year, arrangements are being made for large storage space at strategic points where reserve supplies of bait materials can be stored for use and reshipment during rush seasons. Five such points in the Northwest and 10 in the Southwest are being selected.

Mormon cricket control.--Preliminary plans for dusting operations in the coming season is going forward at the field headquarters at Salt Lake City, including estimation of the quantities of mixed dust needed for work in the 10 cooperating States.

Indian Agencies to help control hoppers and crickets.--The Office of Indian Affairs of the Department of the Interior is making preliminary arrangements with superintendents of Indian Agencies in the infested areas, for increased control operations in the Mormon cricket and grasshopper control campaigns in 1939, in cooperation with this Bureau and the States concerned.

White-fringed beetle control.--Quarantine enforcement is being carried out in cooperation with the States in the various areas and in line with the policy that effective compliance on the part of shippers can best be obtained through a full understanding of the measures gained by personal visits of inspectors. Larval inspection has been carried on to some extent in all infested areas, and close observation has been made as to any soil movement in construction work or with nursery stock. Larvae were recently found on 17 additional properties in the Monroeville, Ala., area. Larval checks have also been made at Florala, Ala., in fields to be planted to truck crops, in order to assist growers in selecting locations for such

fields. Shippers of products of lumberyards, nurseries, mills, gins, and truck crops have been contacted by inspectors and informed as to sanitary measures that must be taken in order that products may be certified for shipment. Seed Irish potatoes and sweetpotatoes constitute a large percentage of the restricted articles now being moved from the regulated areas. Patrol inspectors are assisting in enforcement of the quarantine and shipments are either turned back or the soil is removed from plants or vegetables. In preparation for control operations, over 400 acres of land have been cleared in Mississippi and Alabama since the first of the year.

Sweetpotato weevil work.--Control and eradication activities relating to the sweetpotato weevil were carried out in February in cooperation with the States of Alabama, Georgia, Mississippi, and Texas. Inspections were made of infested properties and those adjacent, as well as nonregulated area. Sweetpotatoes stored both for consumption and planting were inspected and a check was made of plant-bed sites on properties released from quarantine. About 3,000 bushels of sweetpotatoes were moved under permit from Baldwin County, Ala., to southern markets. The freezing temperatures and excessive rains throughout the eradication areas in February have been effective in destroying any host plants remaining in the fields, thereby resulting, it is believed, in a high mortality of the weevils.

Progress in tree removal for control of peach diseases.--The destruction of diseased, abandoned, and escaped peach trees is going forward in 8 States infected with peach mosaic or phony peach disease, and included the removal in February of 710 mosaic-infected trees, and over 900,000 abandoned or escaped peach trees. Such activities in Georgia are being conducted in 14 counties and the work is nearing completion in a number of counties in the commercial area of that State. The Illinois Department of Agriculture reports that more than 500,000 worthless peach trees have been removed since the beginning of the project by that State over 2 years ago.

States modify quarantines on the phony peach disease.--Representative of standardized quarantine action to meet the current reduction in area infected by the phony peach disease, the States of Alabama and Illinois have recently modified their quarantines by eliminating from the regulated areas the States of Oklahoma and Maryland, as well as five counties in other States.

Two States extend peach mosaic quarantines.--State quarantines of California and Colorado relating to the peach mosaic disease were extended to include counties found infected in Colorado, Texas, and Utah in 1938.

Transit inspection.--With nursery-stock shipping at a low ebb in February except at more southern points, the number of interceptions for quarantine violations totaled 105. From Boston came the report of a marked increase in freight shipments, with the percentage of violations in freight exceeding by far that of any period during the previous 12 months. The principal restricted products seen at that station consisted of sawdust, reels, lumber, and marble chips.

Transit inspector's meeting at Chicago.--A general meeting, at which matters relating to transit inspection activities at the individual stations and plans for coordinating the work at the several stations to eliminate

duplication of inspection were discussed, was held at Chicago on March 13 and 14. One of the features of the conference was a tour of the Post Office Terminal Building in Chicago, conducted by postal officials, and the operations of routing mail into and through that terminal were thoroughly explained. The meeting was attended by 11 transit inspectors including those representing various stations of the Midwest, 3 State cooperators, and a representative each of the Division of Foreign Plant Quarantines and of the Post Office department of the city of Chicago. M. J. Kelly, previously in charge of transit inspection in the Eastern region and since returned to Japanese beetle work, was present, also E. A. Burns, now in charge at the New York City station, and acting in charge of the Eastern region.

Chicago inspection points increased.--The Chicago Freight Tunnel System, which operates 62 miles of tunnels under the city streets and is connected with all important transfer freight houses, affords additional locations where plant shipments may be checked, the company having graciously arranged to provide such information as to such shipments to the transit-inspection office. Telephone calls from the company will indicate at which of their 4 stations and when shipments on the tunnels can be seen. Other points where similar arrangements for such contacts were recently made by transit inspector J. M. Corliss, are 3 carloading companies handling L. C. L. packages constituting 90 percent of the incoming and outgoing freight of this nature, 27 trucking concerns handling over 2,000 trucks carrying on interstate commerce, 2 electric lines, and an airport. The Railway Express Agency will make an actual count of their plant shipments arriving in Chicago in the first 10 days in April, representing a count of nursery stock shipments on 3,500 trains. This splendid cooperation on the part of the company will furnish the transit-inspection office with data as to trains carrying the greatest volume of plant material into Chicago for delivery there or to points beyond.

Citrus canker eradication.--Eight inspectors are assigned to search for citrus canker in Louisiana and 11 in Texas, to be assisted in tree removal by 210 relief laborers in the latter State. No infections of citrus canker were found in either State in February. In another reworking of 14 formerly infected properties in Brazoria and Galveston Counties, Tex., the inspectors found Citrus trifoliata on but 5 properties and these were only a few small seedlings. The bayou and canal areas of Terrebonne Parish, La., are being inspected with the use of a boat equipped with an outboard motor. This area is settled principally by muskrat trappers who live in houseboats and camps along the canal, and considerable numbers of citrus seedlings are being found at these sites. House-to-house inspection of Weeks Island, Iberia Parish, disclosed 25,700 small citrus trees, chiefly orange, and 300 Citrus trifoliata in a location where Satsuma oranges were planted about 25 years ago. House-to-house inspection has been completed in Saint Mary Parish, La.

CONTROL INVESTIGATIONS

Western States accept fumigation process.--A. C. Johnson reports that a fumigation process for fruit-bearing nursery stock, in which the nursery stock is fumigated with methyl bromide against the hibernating larval stage of the oriental fruit moth, has been practically completed. The present

requirement is a dosage of $3\frac{1}{2}$ pounds of the fumigant per 1,000 cubic feet for an exposure of 4 hours at a temperature of 70° F. Heretofore, fruit trees grown in areas infested with the oriental fruit moth have not been permitted to enter certain Western States now free from this insect. One nursery in Missouri is using this process at the present time and more than 130 shipments have been treated.

INSECTICIDE INVESTIGATIONS

New adhesives for insecticides.--Most of the new synthetic organic insecticides, as well as the insecticides of plant origin, adhere poorly to vegetation to which they are applied and hence are easily removed by rain or wind. This seriously limits their usefulness. In order to overcome this lack of adhesiveness it is customary to add so-called stickers to the spray or dust. The Division of Insecticide Investigations has for some time been carrying on studies to find new materials that could be used with insecticides to make them adhere to foliage. L. D. Goodhue, of this Division, has found that certain chemical compounds and mixtures which, although nonadhesive at the time of application to plants with the insecticide, undergo a chemical change after exposure to sunlight and become adhesive, resinous, tacky, and insoluble in water. Materials of this class include the reaction products of furfural with aromatic amines, for example, beta-naphthylamine, aniline, and para-toluidine. Other materials which are suitable are the reaction products of furfural with certain ketones, for example, acetone, methyl ethyl ketone, acetophenone, benzophenone, and 2-naphthyl ketone. The material which is to act as an adhesive is intimately mixed, preferably by grinding, with the insecticide. United States patents 2,146,257 and 2,146,258, covering these inventions, were awarded Mr. Goodhue on February 7, 1939.

Investigation of pyrethrum flowers continued.--The structures of the two active principles of pyrethrum flowers, namely, pyrethrin I and pyrethrin II, have been studied by H. L. Haller and F. B. LaForge for some time. Although the complete structures of these compounds are not yet known, considerable progress has been made in this study. The fourteenth paper reporting the results of these investigations has just been published (Jour. Organic Chem., vol. 3, no. 6, pp. 543-549, January 1939). S. I. Gertler and H. L. Haller have determined the pyrethrin content of sprays made by stirring pyrethrum powder in kerosene and pouring off the supernatant liquid. They have recently reported (Soap, vol. 15, no. 1, pp. 93-94, January 1939) that the pyrethrins in pyrethrum powder are readily soluble in kerosene and that when pyrethrum powder is mixed with kerosene in the ratio of 1 pound to 1 gallon and allowed to macerate for 48 hours, about 94 percent of the pyrethrins in the powder become dissolved in the kerosene. However, because of the highly variable and generally poor quality of pyrethrum flowers on the American market, there is little likelihood that the purchaser will obtain a pyrethrum powder containing as much as 1 percent pyrethrins and, unless pyrethrum of this grade is used, the resulting kerosene extract using a ratio of 1 pound flowers to 1 gallon of kerosene will contain less than 100 mg. pyrethrins per 100 cc., the concentration considered necessary to make a good fly spray. Furthermore, in the process of decantation, there is a loss of about 27 percent in the volume of the solution. If low-grade pyrethrum powder is used, necessitating a ratio of powder to kerosene of possibly as high as 2 pounds to 1 gallon, the mechanical loss may be as high as 43 percent.

Information on fluorine insecticides.--R. H. Carter and Mrs. R. L. Busbey have compiled information from the literature through 1935 relating to the use of fluorine compounds for insect-pest control. The large volume of literature on this subject is indicated by the 692 references in their publication (U. S. Dept. Agr., E-466).

Chemicals used in tree injection.--R. H. Carter has compiled information (U. S. Dept. Agr., E-467) obtained from 116 publications and patents relating to the use of various chemicals for injection into trees and growing plants for the control of insects and fungi.

Literature on spray residues.--Mrs. Busbey has compiled information (U. S. Dept. Agr., E-463) from 786 publications and patents relating to insecticidal spray residues, especially arsenic, lead, and fluorine. The following topics are discussed: Public health aspects of the spray-residue problem; legal aspects, processes, and apparatus for the removal of spray residues from fruits and vegetables; the relation of spray programs to residues; methods of analysis for various types of spray residues; and the results of analysis of sprayed fruits and vegetables. This is the most complete publication to treat all aspects of the spray-residue problem that has appeared.

Recent data on derris and Lonchocarpus.--The wholesale price of powdered derris has recently declined sharply and powdered derris of 4-percent-rotenone content is now quoted at 2 cents a pound less than the equivalent grade of powdered cube. The principal reason for this is that high-grade derris containing from 8 to 10 percent of rotenone has recently become commercially available in this country. This high-grade derris is now obtainable from Sumatra, Java, and the Federated Malay States. D. R. Koolhaas, director of the laboratory for chemical research at Buitenzorg, Java, who recently visited the Department, informed us that he had analyzed a sample of derris grown in the Netherlands East Indies that contained 16 percent of rotenone. This figure is exceptional, but several samples examined by this Division have tested 10- or 12-percent rotenone. The highest rotenone content ever found in a specimen of Lonchocarpus is reported to be 20 percent. The highest rotenone content found in the devil's-shoestrings (Tephrosia virginiana) growing in Texas is 4 percent. The Department of Commerce has recently released figures on the importation of rotenone-bearing roots into the United States for the years 1936, 1937, and 1938. Last year the total importation of these roots into this country exceeded 3 million pounds. Assuming an average rotenone content of 4.5 percent, this material would make about 14 million pounds of insecticidal powder of 1-percent-rotenone content. These data show a very striking growth in the use of rotenone insecticides. When investigations were started on the chemistry of derris and cube about 10 years ago, neither of these products was commercially available. In the publication E-463, R. C. Roark has reviewed the use of derris as an insecticide for the period 1919-28. A further review, which will bring the history of the use of this product up to date, is now being prepared.

BEE CULTURE

Sex determination in honeybee similar to that in *Microbracon hebetor*.---

The problem of sex determination in the honeybee has long baffled geneticists. Since Whiting's discovery of biparental males in the parasitic wasp *Microbracon hebetor* (Say), another hymenopteron that produces males parthenogenetically, speculation has arisen as to whether biparental drones are not to be found in the honeybee. The finding in the Beltsville, Md., apiary of a drone, termed by Whiting a haplo-diploid male mosaic, has added to interest in the problem. Whiting's original finding in *Microbracon* was occasioned by the occurrence of a few black-eyed drones in a culture headed by a queen homozygous for orange-colored eyes but mated to a male with black eyes, the dominant color. Consequently, crossing bees bearing the common eye color with those bearing some mutant eye color naturally suggests itself in trying to solve the problem in the honeybee. There are several mutant eye colors in the honeybee, white being the most common. In nature only drones have white eyes, and so the character is apparently recessive. Otto Mackensen, of the Southern States bee culture laboratory, Baton Rouge, La., last season obtained stock bearing white eye color and is now attempting to establish the occurrence of diploid drones through its use, after having already obtained indications, based on finding reduced viability in the brood of queens inseminated with sperm from more than one drone, that differential maturation actually occurs in the honeybee as postulated for *Microbracon* by Whiting in explaining the occurrence of diploid males in that form. Mackensen has obtained homozygous white-eyed queens by artificial insemination, and reports: "The necessary cross, homozygous white queens X normal drones, has now been made and the fertilized queens are being overwintered in an incubator. If none of these queens survive until spring sufficient stock is being overwintered in nuclei to make a repetition of this cross possible early in the spring. * * * If normal-eyed drones occur in the F_1 generation these must be biparental, because the normal condition can only be contributed by the drone parent." Mackensen reports in part concerning his work last season on the viability of brood: "In the spring of this year an experiment was begun, the purpose of which was to determine the effect of inbreeding on brood viability. There were two reasons for beginning such an experiment. (1) It was known that in the related form *Microbracon* inbreeding brings about a great reduction in egg viability and the appearance of biparental males. The inviable eggs are thought to represent biparental males which did not live to maturity. Since the occurrence of such males constitutes one of the most important parts of the evidence which Whiting brings forth in support of his theory of sex determination, a test for their occurrence in the honeybee might give some suggestion as to the manner of sex determination in this insect. (2) From a practical standpoint, it was of interest to find the fundamental cause of the low brood viability found in a certain strain of bees under test at the Laramie, Wyo., laboratory. Since this strain was rather closely inbred, as compared to another strain which showed a high brood viability, it seemed advisable to conduct an inbreeding-viability experiment to see whether inbreeding in general could be a fruitful cause of low brood viability. The following rather severe program of inbreeding was therefore planned. Two queens were selected, each of which was to head an inbred line. In each line part of the queens of each generation were to be back-crossed to the drones of the original queens (inbred) and part of them mated to drones from an unrelated strain (out-crossed). Then the viability of the brood of these inbred and outcrossed

queens of each line was to be compared with that of the original queen of the line. The experiment was continued until it was found that the brood viability of both the inbred and outcrossed queens was greatly reduced and to about the same extent in the two classes of queens. This result showed clearly the presence of some factor which had a much greater effect upon brood viability than inbreeding, and the experiment was discontinued. In looking for an explanation for the above results, it was noted that the main difference between the naturally mated parent queens and the inbred and outcrossed daughter queens was that the parent queens had mated with one drone, whereas the daughters (artificially inseminated) had each been mated to several drones. It was therefore decided to test the brood viability of queens inseminated with only one drone in order to determine whether the reduction in viability was due to multiple matings or to the artificial insemination process. Two such queens started laying in time to make viability tests before winter, and the viability of the brood of these queens was found to be similar to that of the parent or naturally mated queen."

More royal jelly produced by bees fed sugar sirup than by those fed diluted honey.--S. E. McGregor, Baton Rouge, has compiled data indicating that bees in swarm boxes produce more royal jelly and accept more calls when they are given sugar sirup than when they are given diluted honey. The resulting queens also appear to be slightly heavier under these conditions. These data are shown in the following table.

Food given :	:Grafted cells		:Royal jelly produced:		:Average weight of--	
	:	:	:	: Average per :	:	:
	:Offered:	:Accepted:	:Total:	:accepted cell:	:Larvae:	:108 Virgins
	:Number	:Number	:Gm. :	Mg.	: Mg. :	Mg.
Sugar sirup----	: 1,440	: 1,229	:164.4:	134.0	: 36.0 :	196.0
Diluted honey--:	: 1,440	: 1,021	: 83.6:	82.0	: 27.0 :	187.0

IDENTIFICATION AND CLASSIFICATION OF INSECTS

Record concerning supposedly rare ichneumonid parasite.--Seven specimens, determined by R. A. Cushman as Schlettererius cinctipes (Cress.) (family Stephanidae), were received from G. R. Struble, of the forest-insect laboratory at Berkeley, Calif. Previously the species was represented in the National Museum Collection by only seven female specimens. The new series, however, contained four males. Although no previous indication of host association had been recorded, Mr. Struble reports that his material was reared from ponderosa pine infested with flat-headed borers and a species of siricid. It is suspected that the coleopterous larvae, rather than those of the hymenopteron, served as hosts, but this point requires verification.

A North American chalcid fly submitted from Guam.--Five specimens reared from lepidopterous pupae taken from a China Clipper plane at Inarajan, Guam, and forwarded by R. G. Oakley, have been identified by A. B. Gahan as Brachymeria hammari Cwfd., a North American species of Chalcididae that is parasitic on the oriental fruit moth, the strawberry leaf roller, and various other Lepidoptera.

Reported habits of certain ants submitted for determination.--Ants determined by M. R. Smith as Lasius niger var. sitkaensis Perg. were found by W. W. Baker, of the Bureau's laboratory at Puyallup, Wash., "carrying Byturus larvae which had dropped to the soil." The same observer noted a species, determined by Mr. Smith as Formica rufa obscuripes var. melanotica Emery, "feeding on stamens and pistils of raspberries at Tacoma, Wash." Species identified as Monomorium minimum (Buckley) and Lasius niger var. americana Emery were reported by investigators of the Division of Fruit Insects as preying on larvae of the codling moth at St. Joseph, Mo.

The name of the banded greenhouse thrips.--Since the recent list of "Common Names Submitted for Approval, 1939" has been sent for consideration to members of the American Association of Economic Entomologists, several inquiries have reached this Division concerning the combination Hercinothrips femoralis (Reuter), for which the common name "banded greenhouse thrips" is proposed. Floyd Andre has submitted the following statements in explanation of the change in the generic name from Hercothrips to Hercinothrips: "When femoralis was described in 1891 by O. M. Reuter, it was placed in the genus Heliothrips Haliday. Hood (1927 Psyche, 34: 233) erected the genus Hercothrips for several old species originally placed in Heliothrips and several new ones described at the time which had a costal fringe of bristles on the forewing, and wing venation somewhat different from that of the type of Heliothrips (haemorrhoidalis Boucho). This combination was accepted by almost all workers and was used until Bagnall (Ann. Mag. Nat. Hist., ser. 10, 10: 506, 1932) erected the genus Hercinothrips to include those species previously placed in Heliothrips and Hercothrips which have in common a head with a collar showing laterally a dentiform prominence, a strongly transverse pronotum which is much shorter than the head, and forewings with veins regularly set with bristles. The combination Hercinothrips femoralis is being used by most thysanopterists both in Europe and America and should be considered the proper designation for this species."

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UNITED STATES
DEPARTMENT OF AGRICULTURE



BUREAU OF
ENTOMOLOGY AND PLANT QUARANTINE
NEWS LETTER

VOLUME VI 515

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

NEWS LETTER

FOR MARCH 1939

Vol. VI, No. 5

(Not for publication)

May 1, 1939

ADMINISTRATION

Drawings for reproduction.--Considerable difficulty is experienced in making satisfactory photographs of large charts and graphs submitted by the several divisions of the Bureau. It should be taken into consideration that in reducing a large graph to a 5 by 7 or 8 by 10 plate involves so much reduction that thin lines are often obliterated. We would suggest that those preparing graphs and charts keep this in mind, making all letters large enough that when reduced they will be legible. All ruling and other line work should be done with a right-line or contour pen, which will give a line thick enough that when reduced it may be easily read.

FRUIT INSECT INVESTIGATIONS

Some hickory shuck worms carry over two winters.--G. F. Moznette, of the pecan-insect laboratory at Albany, Ga., reports that adults from overwintering larvae of the hickory shuck worm (Laspeyresia caryana Fitch) emerge throughout the following season and that a considerable proportion of them carry over into the second year. From pecan shucks collected in the fall of 1936, moths emerged at intervals throughout the season of 1937, the last 1 appearing on December 28. The following spring emergence was resumed on March 15, and continued until April 26. From this lot of material the total emergence was 597, of which 92 individuals carried over two winters.

Relation between fruit damage and parasitization of oriental fruit moth.--William P. Yetter, Jr., and H. W. Allen, of the oriental fruit moth parasite laboratory at Moorestown, N. J., have recently completed a report on detailed studies of the relation of the degree of parasitization of the twig-infesting generations of Grapholitha molesta (Busck) in the spring and subsequent injury to fruit at harvest time by later generations of this pest. Although it has been generally assumed that high parasitization early in the season would be followed by a minimum of damage to peach fruit later on, few actual figures have been available. The data from the more detailed experiments carried on in 1938 are as follows:

Orchard No.	Parasitization : of twig-infesting larvae	Ripe fruit : injured
	Percent	Percent
1-----:	78.2	5.0
2-----:	75.9	3.1
3-----:	65.9	16.5
4-----:	62.6	21.4
5-----:	61.3	3.7
6-----:	60.8	17.6
7-----:	53.1	32.0
8-----:	49.5	28.8
1-2-----:	77.1	3.9
3-6-----:	62.6	14.6
7-8-----:	51.3	30.4

Pecan nut casebearer reared on pecan leaves and twigs.—S. O. Hill, of the Monticello, Fla., pecan-insect laboratory, has found that Acrobasis caryae Grote is not dependent upon nuts for food. Mr. Hill has reared a number of individuals from egg to adult on leaves and shoots. The series of larvae reared on twigs and leaves reached maturity in practically the same time as those reared on nuts, the average period from egg to adult being about 30 days. This offers an explanation of the occurrence of severe infestations early in seasons following years when no nuts were present on the trees and indicates that no reduction in infestation can be counted on in seasons following years of crop failure.

MEXICAN FRUITFLY CONTROL

Mexican fruitfly activity in the lower Rio Grande Valley.—Trap catches in February indicated that more than the normal number of flies were in the area and with this condition it was to be expected that many larval infestations would be discovered. A total of 1,404 such infestations was found in the lower valley and 6 additional infested properties were listed in and near the city of Laredo, in Webb County. Heretofore fruit from infested groves has been withheld from shipment, but this season fruit from the infested parts of groves has been permitted to be packed after sterilization by the high-temperature method. Sterilization plants in the quarantined area now have a daily capacity of approximately 50 carloads of fruit.1

CEREAL AND FORAGE INSECT INVESTIGATIONS

Sugarcane borer hibernation in Louisiana.—E. K. Bynum and W. E. Haley, of the Houma, La., laboratory, in further studies of sources of spring infestation by Diatraea saccharalis (F.), found an average of 17 live insects per acre overwintering in cane stubs. The average number found per acre during the previous 4 years was 31. The largest number of live insects were found in stubs of the variety C. P. 29/116, which is the most susceptible to borer injury of any variety now grown commercially in Louisiana. Average numbers of live insects per acre found overwintering in burned trash, left on the field at harvest time, in varieties in replicated test fields on light and on heavy soils were as follows: C. P. 29/116, light soil--97, heavy--17; C. P. 28/19 light--121,

heavy--24; and Co. 290, light--48, heavy--0. Three live insects were found overwintering in 3,925 culms of Johnson grass. No sugarcane borer was found overwintering in corn or in the wild grasses Erianthus giganteus and Phragmites communis.

Varietal susceptibility to injury by sugarcane weevil.--Stubs of various varieties of sugarcane in a replicated test field were examined by J. W. Ingram, W. E. Haley, and L. J. Charpentier, Houma, for injury by Anacetrinus subnudus Buch. The percentages of buds of the various varieties killed directly by weevil larvae or through red rot entering weevil tunnels were as follows: C.P. 28/11--29.98, C.P. 29/320--21.85, C.P. 29/116--20.68, Co. 281--16.90, Co. 290--15.25, and C.P. 28/19--14. The low level of significance for differences between varieties, determined by the analysis of variance method, was found to be 12.51.

Naupactus n. sp. active at Gulfport, Miss., during the winter.--According to records obtained by J. B. Gill, Gulfport, active adults of Naupactus n. sp. were taken in the field over a period of 8-1/2 months. The first adults were taken on May 26, 1938, and the last on February 13, 1939. Freezing temperatures occurred as early as November 25 but active adults could be found on warm days as late as February 13. Adults were observed feeding on rose, clover, plantain, carpet grass, and other kinds of foliage during the winter. These adults deposited fertile eggs when confined in outdoor cages. Undoubtedly they deposited many eggs under field conditions during the winter. The average incubation period for eggs deposited during the winter was approximately 57 days, as compared with approximately 15 days for eggs deposited during June, July, and August.

Winter mortality of white-fringed beetle larvae.--B. A. App, of the Floral, Ala., laboratory, reports that the average mortality of white-fringed beetle larvae between November 1, 1938, and February 1, 1939, was 47.5 percent. The average larval mortality during the similar period of the preceding year was 52.1 percent. These records are based on soil samples taken at 72 points in 8 fields in the Floral area.

Infestation by hessian fly causes more severe winter killing.--W. B. Cartwright, Lafayette, Ind., reports that the effect of fall hessian fly infestation on cold resistance in the winter wheat varieties Leap, Poole, Michigan Amber, Kanred, and Minhardi was recorded in controlled tests completed in December 1938. The infested plants showed considerably more winter killing than noninfested plants under the same controlled conditions and was true in lots subjected to controlled freezing tests and those subjected to only freezing conditions. The range of winter survival in infested plants in controlled freezing tests was 1.3 to 13.8 percent, as compared to 11.9 to 80.2 percent in noninfested plants.

Artificial infestation of white grubs with nematodes.--H. R. Painter, Lafayette, reports that, to determine the possibility of infesting Phyllophaga larvae with the nematode Neoplectana glaseri, 120 grubs were caged individually with 1 ounce of air-dried soil in 2-ounce tins. Grubs were arranged in 6 series of 20 tins each. A suspension of nematodes in distilled water contained 10,000 nematodes per cubic centimeter. Each series of grubs was treated with a different amount of the suspension. Treatment was made by adding to the soil in each tin a certain quantity of the suspension diluted as needed to give a certain

number of nematodes per cubic centimeter or ounce of soil. A definite quantity of distilled water was added to soil, as needed to maintain proper moisture conditions. Observations were made twice weekly over a period of 2½ months. Results are shown in the following tabulation.

Series	:Nematodes per : Grubs	
	:ounce of soil :parasitized	
	Number	Percent
A-----	100	65
B-----	500	45
C-----	1,000	95
D-----	2,500	95
E-----	5,000	80
F-----	10,000	95

Tests of insecticides against white-fringed beetle.---In summarizing insecticide tests made at Florala, Ala., during 1936 against the white-fringed beetle, H. C. Young and L. S. Henderson report that calcium arsenate gave better control than magnesium arsenate and lead arsenate. In laboratory tests poisons tested were as follows: Calcium arsenate, 87.0; magnesium arsenate, 83.8; lead arsenate, 67.1; cryolite (24.4 percent flourine), 52.3; and a cryolite-sulphur dust (10.3 percent flourine), 26.6. In field-cage tests on cotton plants, the percentages of control 92 hours after treatment for the poisons tested were as follows: Calcium arsenate, 65.8; magnesium arsenate, 58.3; lead arsenate, 53.7; and cryolite, 50.3. In laboratory tests on peanut foliage cryolite gave 75.7 percent control in 72 hours and in field cages on peanut plants cryolite gave 77.9 percent control in 98 hours. The cryolite used in these tests did not cause any plant damage when applied to peanut and velvetbean plants, but all the arsenicals used injured the plants. Cryolite gave better control when used on peanuts than when used on cotton. This was due to the fact that the beetle consumes much more leaf surface when feeding on peanuts than when feeding on cotton.

JAPANESE BEETLE CONTROL

Burning crews furnished with fire pumps.---Each elm-sanitation crew in Connecticut was furnished with 2 fire pumps on March 27. Those pumps, of 5 gallons capacity each, are to be on hand at all locations where elm material is being burned. The pumps deliver a constant stream of water by slow pumping of the plunger integral with the spray rod. Two nozzle tips are available, one for a long straight spray and the other for a short, fan-shaped spray for ground fires. A strip of steel is welded to the bottom of each pump to prevent puncturing of the brass bottom by any sharp stones on which the pump might be set. The crews with this equipment have been able to backfire around fire locations in grass lands, thereby reducing one of the greatest hazards of fire spread. Sixty of these fire pumps have been assigned to Connecticut crews and 100 have been obtained for use in New Jersey.

Sanitation work centered in Connecticut "hot spot."---Four sanitation crews have been assigned to the most northern and eastern localized infection center in Connecticut, near Weston. The crews removed three elms from a small island in the middle of the Aspetuck River. These trees were not dead or devitalized, but were so located that sampling would be difficult if the trees show symptoms

of foliage wilting this summer. Twig samples from one of the elms were later confirmed as containing the Dutch elm disease fungus.

Quantities of beetle wood destroyed on hospital grounds.--Cutting and burning of fallen elms was performed on the New York State Hospital property on Staten Island during the month. It is estimated that more than half of the 4,000 elms on this property will be removed in connection with the laying out of roads and the erection of 39 hospital buildings. This material must be destroyed before it can become infested with elm bark beetles.

Two first-record infections in Pennsylvania.--In March confirmations were received covering solitary elms in Wrightstown and Tinicum Townships, Bucks County, Pa., both first records for these townships. Three additional infections were reported from Upper Makefield Township of the same county, from which 13 infected trees have already been removed. Total infections found in Pennsylvania numbered 25 at the end of March.

Autogiro crew returns to home airport.--The autogiro unit that has been engaged in aerial scouting under the supervision of the Division of Pink Bollworm Control since December 2, 1938, completed its work for that division on March 11. The ship was returned to the USDA airport at Preakness, N. J., on March 15.

Increased force for nursery inspection.--A number of temporary inspectors was added to the field force in March to take care of increased demands for Japanese beetle inspection and certification of nursery and greenhouse stock. Two inspectors were assigned to a branch warehouse established in Pittsburgh by a large nursery handling both certified and uncertified stock from northern New York, southern New Jersey, and Norfolk, Va. Uncertified stock is segregated in a separate room of the warehouse, but it is necessary to check on the movement of uncertified stock to classified dealers. Three establishments purchasing uncertified stock from the warehouse and introducing it into their certified greenhouses have had their classifications revoked. An extra inspector was assigned to the greenhouse of a large shipper of Easter plants at Norwood, Pa., and another inspector was assigned for the duration of the spring shipping season to the West Grove, Pa., area. A number of large and small rose-growing establishments are located in the latter area. Early in March a temporary inspector was assigned to a nursery at Princess Anne, Md., to take care of the increased volume of work. During the month this inspector examined and certified approximately 710,000 soil-free plants. At Salisbury, Md., 3 additional inspectors were required to examine approximately 3,000,000 strawberry plants offered for inspection by a large shipper there. These inspectors worked in shifts to correspond with the hours worked by the shipping personnel. Another temporary inspector was stationed at a second Salisbury nursery to take care of strawberry-plant inspection. In Delaware an additional inspector was employed on the State payroll and was stationed at Selbyville.

Methyl bromide fumigation.--Enthusiasm for methyl bromide fumigation of nursery stock is continuing among the nurserymen. Five fumigation chambers of varying sizes and construction have been built and are in operation in New Jersey nurseries. Two additional boxes are now being constructed. A total of 75,725 plants was fumigated for certification in March. Demonstrations of this method of fumigation were made in Connecticut and Pennsylvania. Sixty nurserymen

and greenhouse men attended a demonstration at the A. N. Pierson greenhouses at Cromwell, Conn. District inspectors in that territory were also present. Another demonstration was staged at the Campbell Nursery, Strafford, Pa., where Mr. Campbell is particularly interested in hydrangeas. An order for 2,000 hydrangeas of a new variety in 2½-inch pots was fumigated and shipped the same day. Contact calls concerning the fumigant were made at the principal nurseries on Long Island, many of which are now contemplating the construction of chambers. A large iris grower who is moving his nursery from infested premises on Long Island to a non-infested section of northern New Jersey plans to erect a chamber to fumigate approximately 250,000 iris roots. A demonstration of the fumigation procedure was given at an establishment on Staten Island, N. Y., with several interested local growers present. Shippers on the Eastern Shore of Maryland and in Delaware have also been informed of this procedure.

Soil treating for Japanese beetle control in North Carolina.—Lead arsenate applications at the principal Japanese beetle infestations discovered in North Carolina during the past few years were started in Greensboro and Winston-Salem on March 27. By the end of the month 21.5 acres had been sprayed in Greensboro and 20.3 acres in Winston-Salem. Federal spray trucks, truck drivers, and supervisors have been furnished. Lead arsenate and labor for its application have been supplied through a \$30,000 appropriation by the State Assembly. In addition, the State Assembly has passed a bill appropriating funds for soil poisoning of Japanese beetle in the State during the next biennium, \$35,000 being appropriated for the first year and \$25,000 for the second year, making a total of \$90,000 appropriated by the 1939 General Assembly for Japanese beetle control work in the State.

Surveys of newly regulated areas.—In March a survey was completed of the newly regulated area in Ohio. Very few establishments were found that will require classification under the quarantine regulations. The Cuyahoga County area surveyed is said to contain more glass than any other corresponding area in the United States. It is claimed that for a distance of 1½ miles on Schaff Road there are 3,000,000 square feet under glass. The ranges are devoted principally to the growing of vegetable and flowering plants. Owing to the extension of the Ohio regulated area, approximately 50 establishments were removed from the classified list, since their markets are now entirely within the regulated area.

Spring nursery shipping season under way.—Large quantities of nursery stock move under certification for many of the quarantined States. Forty-two carloads of certified stock were shipped from New Jersey.

Airplane deliveries of nursery stock.—The home-garden department of one of the Pittsburgh department stores, classified under the Japanese beetle quarantine regulations, on March 15 inaugurated airplane delivery service of nursery stock to their customers in Ohio, West Virginia, and western Pennsylvania.

Nursery shipping season delayed in New England.—New England nurseries were delayed in their digging and shipping operations in March by snow and continued cold weather. Five temporary inspectors were employed to examine nursery stock being shipped from the Newport, R. I., and Manchester, Conn., districts. Digging operations started in Newport on March 2 and at Manchester on March 29. In Maine, New Hampshire, Vermont, and Massachusetts, the ground was still frozen all through March and many nurseries were covered with snow and 3 feet of snow still covered one of the large forest nurseries at Fryeburg, Maine.

FOREST INSECT INVESTIGATIONS

Distribution of European spruce sawfly in northern Europe.--W. F. Sellers, of the New Haven, Conn., laboratory, has completed a report on the distribution of the European spruce sawfly in Scandinavia and the eastern Baltic countries, based on his observations in these countries. Mr. Sellers summarizes his findings as follows: "The European spruce sawfly was found everywhere on spruce from the German-Danish border to the northernmost spruce forests of Sweden and from Lithuania to far above the polar circle in Finland. The range of distribution was from approximately lat. 55° in Denmark and Lithuania to lat. $68^{\circ} 45'$ in Finland, which is about 180 miles north of the Arctic Circle. This included most of the Scandinavian Peninsula, Fennoscandia, and the eastern Baltic countries. The most favorable habitat was found in the one-generation area under conditions which provided a maximum of sun heat, moisture, and shelter near to the upper limits of spruce-tree growth. The least favorable habitat occurred in the drier, less humid places, especially in the two-generation area. Spruce comprised from 25 to 40 percent of the productive forest land of this tremendous area. The principal contribution of this survey was to greatly extend our knowledge of the distribution of this insect in Europe and to open up an extensive new area for parasite exploitation."

Status of oriental moth in Massachusetts.--J. V. Schaffner, Jr., and P. B. Dowden, New Haven, visited the permanent observation plots for the study of Cnidocampa flavescentis (Walk.) in the vicinity of Boston, Mass., for the purpose of determining the present status of the insect and collecting cocoons to obtain data on the imported parasite Chaetexorista javana B. & B. They report that the Cambridge, Medford, Revere, Chelsea, and Winthrop plots were found to be rather heavily infested. Cocoon-collecting projects by W. P. A. workers were being carried out in Chelsea and Winthrop. In Saugus the infestation was rather light but apparently there has been an increase since 1937. There seemed to be little change in the infestation at Jamaica Plain, Roxbury, Dorchester, South Boston, Neponset, Quincy, Nahant, Everett, and Swampscott, all of which were rather light. The cocoons are being dissected to obtain data on parasitization.

Loss of insecticides applied as dusts.--A study conducted by S. F. Potts, New Haven, of the action of dust particles falling on or moving over plant leaves and needles of different physical structure, showed that in growth of medium density only from 10 to 26 percent of the dust applied actually settled on the foliage, as compared to a deposit of from 38 to 60 percent in ordinary spray mixtures. Furthermore, under average conditions air movement after dust application removed approximately 50 percent of the initial deposit. The loss by wind was greatest at the tops of the trees. In the 11 different insecticides investigated in dust form, from 2 to 26 percent (averaging 15 percent) of the initial deposit remained after 1 inch of rain. Although materials were added to these dusts which greatly increased their initial deposit and adherence, the investigations showed that more efficient methods of application are needed than those now in general use.

Note on life history of Lyctus planicollis Lec.--The Asheville, N. C., laboratory, reports that adults of L. planicollis have emerged in 9 months from sections of hickory logs that had been seasoned in an open shed for only 6 months before they were exposed to infestation. These sections were exposed to Lyctus

in June 1938, and were kept in an unheated building until late in January 1939, when they were placed in a heated greenhouse. Emergence began about March 1.

Type of Black Hills beetle infestation changing.--A marked change in the portion of the boles of ponderosa pines attacked in 1938 by the Black Hills beetle is reported by Donald De Leon of the Fort Collins, Colo., laboratory. In both Utah and Colorado it has been observed that the attacks do not extend as far down the bole as in previous years. During 1936 and 1937 most of the infested trees were attacked down to the root collar and it was necessary to peel all stumps to destroy the brood left there when the tree was felled for burning. On the Roosevelt National Forest, in Colorado, from 60 to 70 percent of the stumps of the trees recently felled for treatment were uninfested and, if peeled, left what is locally called a "white stump." Such large numbers of white stumps would seem to indicate that the population of the beetle is declining and that not enough beetles are present in the forest to attack the bole down to the ground.

Interbreeding Black Hills beetle and mountain pine beetle.--According to C. L. Massey, a graduate student working under the direction of the Fort Collins laboratory, specimens of *Dendroctonus ponderosae* Hopk. from ponderosa pine on the Roosevelt National Forest in Colorado have been successfully crossed with specimens of *D. monticolae* Hopk. from western white pine on the Coeur d'Alene National Forest in Idaho. The resulting progeny has been placed in breeding cages in order to determine whether or not this hybrid strain can reproduce itself. If this strain continues to breed successfully, the progeny of a single pair of beetles, through several generations, will be carefully studied and compared for anatomical differences within the hybrid and with progeny from a single known pair of Black Hills beetles and a single known pair of mountain pine beetles. It is hoped that this study will assist in determining the validity of the two species of bark beetles.

Mountain pine beetle infestation possibly influenced by road construction.--W. D. Bedard, of the Coeur d'Alene, Idaho, laboratory reports on an instance of the apparent effect of road construction on mountain pine beetle infestations in western white pine. By chance, a portion of a roadway constructed in 1933 through a dense stand of 150- to 180-year-old white pine was included in an experimental area being used for various studies on the mountain pine beetle. As a result of these other studies, it was found that severest losses from mountain pine beetle attack had occurred immediately bordering the road, as shown in the following table.

Losses	Distance from road (in chains)			
	1	5	10	15
Trees killed-----	135.0	64.0	12.0	5.0
Percentage of trees killed----	62.5	29.6	5.6	2.3
Accumulative total-----	135.0	199.0	211.0	216.0
Percent-----	62.5	92.1	97.7	100.0

Many trees were injured in the process of road construction as a result of root exposure, dynamite injury, fire damage, and other causes, and it is believed that these injured trees attracted the beetles to the area immediately adjacent to the road, allowing them to breed abundantly in the injured material so that their increased numbers were sufficient to kill many uninjured trees in the immediate vicinity.

Mountain pine beetle control.---J. C. Evenden, Coeur d'Alene, reports that plans are nearing completion for the institution of artificial control by the Forest Service against outbreaks of the mountain pine beetle within the white pine stands of the Clearwater and Kootenai National Forests. On the Clearwater National Forest \$25,000 will be spent in combating a localized outbreak of this insect, and some \$8,000 on the Kootenai National Forest. Work will start on the first of May and an effort will be made to complete both projects as early in June as possible. During the first part of these projects the infested trees will be felled and cut into uniform lengths and the logs decked and burned, as the areas are so inaccessible that salvage of this material does not appear feasible. Later in the season, when the use of fire becomes dangerous, the infested logs will be peeled. When the immature stages of this beetle are exposed through the removal of the bark, they are quickly destroyed by predaceous insects, birds, and small mammals.

Cylindrocopturus longulus Lec. attacks pine plantations in California.---In 1938 this well-known but little-understood weevil attacked from 11 to 19.7 percent of the successful 1932 and 1933 Jeffrey and ponderosa pine transplants in the Big Springs Plantation of the Lassen National Forest, according to K. A. Salnan, of the Berkeley, Calif., laboratory. Though pine plantations in California have been under observation for several years, this is the most serious insect-caused injury that has been recorded. The thriftiest trees seem to have been preferred and the primary cause of the attack and outbreak has not yet been determined. C. longulus is known to infest twigs of white and Douglas firs and has been found attacking Jeffrey and sugar pine reproduction following injuries by fungi or Pissodes. Also it has been reared from insect-caused galls on the branches of Jeffrey and ponderosa pine reproduction.

Matsucoccus scale infesting juvenile ponderosa pine in northern California.---H. L. McKenzie, Berkeley, reports that Matsucoccus bisetosus Morrison was observed on young ponderosa pine near the Hat Creek work center in Shasta County, Calif., infesting the main bole, as well as the lateral branches. On the basis of preliminary scale-population counts, there was apparently a high natural mortality of this scale during the 1938 season. On November 26, 1938, F. P. Keen, of the Portland, Oreg., laboratory, sent branches of young ponderosa pine that were heavily infested with this same Matsucoccus scale, from near Burns, Oreg. In this area, according to Mr. Keen, the infested trees showed badly deformed main lateral leaders, pale and short needles, and cankerlike swellings on the twigs. An examination of this material indicated that the natural mortality of this scale in Oregon was very low and, as a consequence, much injury was being caused. Some climatic or other factor may have been responsible for the high natural mortality of this scale in the Hat Creek area.

Forest tent caterpillar outbreak at an end in Minnesota.---R. H. Nagel, Milwaukee, Wis., submits the following summary of the results obtained from the forest tent caterpillar egg-band survey recently completed on the Superior and Chippewa National Forests. The figures in the following table represent the average number of egg bands found on the twigs of 25 dominant trembling aspen trees cut in each 10-acre plot. Previous records and observations indicated that more than 50 percent of the "old bands" were deposited in 1937.

Superior National Forest

Plot No.	1	2	3	4	5	6	7	8	9	10
Old bands	100.4	59.2	6.6	49.4	33.1	20.4	5.5	9.8	10.5	1.1
1938 bands	6.3	1.5	.4	1.8	2.9	0	0	0	0	0

Chippewa National Forest

Plot No.	1	2	3	--	--	--	--	--	--	--
Old bands	17.2	17.1	16.8	--	--	--	--	--	--	--
1938 bands	0	0	0	--	--	--	--	--	--	--

The probability that the infestation, which began in 1932, would become endemic had been indicated by the sudden decline in caterpillar abundance, disclosed by the studies undertaken in 1938 in two ranger districts (the Cass Lake Ranger District on the Chippewa and the Gunflint Ranger District on the Superior). This decline in the infestation was due in part to weather conditions and in part to parasitization. Inclement weather in May 1938 caused heavy mortality among the first- and second-larval instars and appeared to be the most important factor in the decline in areas some distance from Lake Superior. In the stands near Lake Superior, where the effect of the weather was less pronounced, defoliation was noticeable in 1938, but tachinid and sarcophagid parasites were very effective against the caterpillars of the last larval instar and against the pupae.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Gypsy moth work temporarily suspended.---Exhaustion of emergency funds caused the temporary suspension of W. P. A. gypsy moth work after February 28 in Massachusetts, Connecticut, New York, and Pennsylvania. Sufficient funds were available in Vermont at the end of February for approximately 5 days' additional work. Notice that additional funds for the continuation of work to June 30 in Vermont, Massachusetts, Connecticut, and Pennsylvania was received on March 1, and W. P. A. gypsy moth employees were immediately instructed to return to duty on March 6. Additional funds for the continuation of work in New York were not made available at this time; however, sufficient funds were carried over from February to employ the New York force for 2 days, and arrangements were made through the State administrative office for the resumption of work on March 10. As additional funds were still not available at the end of 2 days, work was again suspended. The needed money was provided in time for the resumption of work in New York State on March 16.

Fire permits restricted by wardens because of woodland conditions.---In previous years many local fire wardens in towns where gypsy moth work was performed willingly issued permits for the burning of forest debris covering an indefinite period to supervisory employees of this project. Present forest conditions, resulting from the hurricane of last September, are such that State and local fire wardens consider the fire hazard much greater than before. They will issue burning permits for a period of 10 days only, and with the distinct understanding that no burning will be done when there is a high wind or in areas where the fire hazard is unusually great.

Barbed wire fences removed.---Barbed wire fences erected for the spraving season of 1938 are now being removed in those areas in which no gypsy moth infestation has been found this year.

Excessive precipitation causes much loss of time in Vermont.--Gypsy moth workers in Vermont lost much time in February because of inclement weather. Somewhat similar conditions prevailed during this period throughout the entire area in which Federal W. P. A. gypsy moth work was conducted. A severe ice storm during the latter part of the month forced the temporary discontinuance of gypsy moth scouting work in Fayston, Washington County, Vt., in the heart of the Green Mountain area.

Informal check proves efficiency of gypsy moth crew.--A single-egg-cluster gypsy moth infestation was found in Starksboro, Addison County, Vt., about the middle of March. It was the first infestation ever discovered in that town, which is within the barrier zone area. The egg cluster was first observed by two experienced regular employees detailed to examination and reinspection work, who were passing the location en route to a distant section of woodland where they were to work for the day. The men did not disturb the egg cluster, as they knew that a crew of W. P. A. scouts would be working through that particular locality within a day or two, and it presented an excellent and unusual opportunity to test the efficiency of the crew. On the following day the scouting crew found the egg cluster. Two additional single-egg-cluster infestations were discovered the following week by other crews, one in Ripton, Addison County, and the other in Chittenden, Rutland County.

Special permission given gypsy moth crews to use Mohawk Trail.--The section of the Mohawk Trail (Massachusetts Route 2) in Berkshire County, Mass., that was completely destroyed during the severe flood last September has been partially rebuilt but is not yet sufficiently completed to be opened to traffic. Special permission was recently granted to gypsy moth crews to pass over the road in order to reach otherwise inaccessible areas in the town of Savoy.

Recent first-aid training proves valuable.--Several gypsy moth supervisory employees located in Greenfield, Mass., recently attended a course of instruction in first-aid treatment, and in turn are instructing other supervisory employees in the field. One of the employees who received the original instruction gave valuable assistance to a young man not connected with the work, who had slipped on the ice and broken his leg. As splints were lacking, the employee strapped the broken leg securely to the other leg before carrying the boy into a nearby residence and securing the services of a physician. The training obtained by these employees will undoubtedly be of service in handling injuries incurred by employees in the field.

New infestation found in Connecticut barrier zone area.--The special scouting crew assigned to duty in the town of Bethlehem, Litchfield County, Conn., which is situated within the barrier zone area, recently discovered a gypsy moth infestation consisting of two egg clusters. This is the first infestation ever located in that town.

Nursery operations delayed on Long Island.--Spring operations in nurseries located in Nassau County, Long Island, N. Y., within the area affected by the State gypsy moth quarantine, usually are in full swing by the middle of March. Heavy snow, followed by muddy ground, retarded large-scale operations until the latter part of the month. By the end of the month the nurseries were operating on a rush schedule, much of the stock being shipped in small lots for planting around private residences, consequently, inspection work increased rapidly late in March.

Scouting for the gypsy moth in New Jersey still yields negative results.---

A report of gypsy moth activities in the State of New Jersey, received during the first part of March from the supervisor in immediate charge of the work in that State, indicates that a small force of State employees performed special scouting work in Sussex, Passaic, Somerset, Hunterdon, Middlesex, Warren, and Bergen Counties in February. Although inclement weather caused considerable interruption in the work, a fair amount of territory was covered. A later report indicates that these men scouted in Sussex, Morris, Somerset, and Bergen Counties during March. No evidence of gypsy moth infestation was found. Intensive extermination work performed in that State several years ago apparently eliminated the pest.

Gypsy moth inspection work increases in Pennsylvania.---The disappearance of snow late in March in the area in Pennsylvania under quarantine on account of the gypsy moth permitted the resumption of outdoor activities, and the volume of quarantine-inspection work increased rapidly. Operators are now actively cutting and moving mine props, laggings, and saw logs from the woods, and plant collectors have resumed work that was temporarily suspended following a heavy fall of snow. By the end of the month there was a marked increase in the digging and shipping of mountain laurel and rhododendron plants taken from wooded areas in the Pocono Mountains. Most of this work was being done in Carbon County, where both mountain laurel and rhododendrons are abundant. Gypsy moth ground work at infested locations was also resumed during this period.

Quarantine violators warned.---There were four violations of the Pennsylvania State quarantine on account of the gypsy moth during the first part of March. As this was the first offense for each of the quarantine violators, who were apparently unfamiliar with the quarantine law, they were officially reprimanded by the State authorities and warned that definite action would be taken in case of a second violation. The shipments that were moved in violation of the quarantine regulations included mine rails, surface stone, and a small amount of junk.

Over 5,000,000 gypsy moth egg clusters creosoted by C. C. C.---C. C. C. enrollees scouted for the gypsy moth when the weather was favorable in March, and did thinning and burning and creosoted egg clusters at heavy infestations on other days. The greater part of the work at the heavy infestation in the Granby-Simsbury area in Connecticut consisted of creosoting egg clusters that were beyond reach from the ground, which included climbing the trees and creosoting egg clusters by the use of brushes attached to long bamboo poles. Since the first of July 1938, C. C. C. enrollees have destroyed by creosoting and burning slightly more than 5,000,000 gypsy moth egg clusters, approximately 4,000,000 of which were destroyed in the Granby-Simsbury area. There was a marked decrease in the number of C. C. C. men employed on gypsy moth work at the end of March, as an enrollment period came to an end at that time and many men left camp because they had spent the maximum of 2 years in the C. C. C. The allotment of men will probably be below normal during the next 2 or 3 weeks, as it takes several weeks to fill the camps to their quotas. This periodical turnover in camp personnel results in losing men who have been well trained for gypsy moth work, and requires the training of new men. As a consequence, there is an impairment in the efficiency of the work and a decrease in volume during this period.

C. C. C. crew discovers gypsy moth infestation in the barrier zone.—About the middle of March the crew from the C. C. C. camp located at Florida, Mass., found a gypsy moth infestation just off the Mohawk Trail, near the Eastern Summit, in the town of Florida. Five egg clusters were creosoted at that time, and three additional egg clusters were found the following week. It is probable that more egg clusters are present at this infestation, but it has been necessary to temporarily discontinue work in this section because of poor ground conditions, as the snow is approximately 40 inches deep. While Florida is located within the barrier zone, and C. C. C. work is usually performed east of the zone, this crew did some scouting in that town on days the superintendent considered unsuitable for the crew to travel to the regular work assignment east of the barrier zone.

PLANT DISEASE CONTROL

Blister rust control in sugar pine region.—With the opening of the field season but a few weeks away, the white pine blister rust control program in the sugar pine region is rapidly assuming definite form. Control work will be carried on by the Bureau of Entomology and Plant Quarantine, the Forest Service, and the National Park Service. The work plans call for 6 camps, using 600 relief laborers, operated by the Bureau, and 14 camps with 550 relief laborers, operated by the Forest Service. In addition, the Forest Service and the National Park Service will each use the labor from 6 C. C. C. camps on National Forest and National Park lands, respectively. In Oregon the Bureau expects to use 4 camps with 400 relief laborers. The program includes the beginning of Ribes eradication on the Tahoe National Forest and Sequoia National Park. Scouting for white pine blister rust in California will probably not begin before July 1, and will be concentrated in the Sierra Nevadas.

State blister rust legislation.—The New York State Legislature has passed a bill authorizing counties to appropriate funds for the control of white pine blister rust. The bill reads in part as follows: "The Board of Supervisors of any county may from time to time appropriate and expend such sums as it may deem proper, not exceeding \$10,000 in any one year, for the purpose of suppressing and controlling white pine blister rust within the county, and may raise money for such purpose by tax on the taxable property of the county. The work for which such monies are so raised and appropriated shall be done under the direction and supervision of the Department of Conservation of the State of New York. In carrying on such work, the board of supervisors may employ such help as may be necessary, to be selected from persons residing in the county. Employees engaged in such work may enter upon any lands, whether publicly or privately owned, for the purpose of suppressing and controlling white pine blister rust and no action for trespass or other cause shall lie therefor. This act shall take effect immediately."

Phenological data.—H. N. Putnam, in charge of blister rust control work in the North Central States, informs us that while on a field trip in Ohio on March 29, he found aecial blisters swollen and projecting through the bark but not yet opened. Ribes buds were also swollen and beginning to burst. H. E. Yost, of Maryland, reports that he found a few blister rust cankers beginning to fruit in Allegany County on March 6. In Tennessee the mild weather early in March resulted in the rapid development of new leaves on Ribes. In Virginia J. G. Luce reports Ribes appearing in leaf near the Shenandoah National Park early in March.

Blister rust meetings held at C. C. C. camps.—A series of blister rust meetings was held in Pennsylvania during the week beginning March 20, a meeting being held each night at different C. C. C. camps from Monday to Friday, inclusive. The 5 meetings had a total attendance of about 915. District leader N. H. Harpp, assisted by State leader R. P. Fatzinger and by Mr. Zary, gave a short talk at each meeting, followed by 2 reels of film on Ribes-eradication work, after which the men had an opportunity to ask questions and examine blister rust posters and specimens. The C. C. C. men seemed very much interested and it is felt that the meetings were well worth the time and effort required. Meetings were also scheduled for the following week.

COTTON INSECT INVESTIGATIONS

Hibernation of boll weevils in surface trash.—Between January 26 and February 24, 1939, F. F. Bondy and C. F. Rainwater examined 200 square yards of surface soil, leaves, and trash taken from 10 localities in the vicinity of Florence, S. C. In an effort to obtain as many weevils as possible, all samples examined were collected near the edge of cotton fields and not more than 50 feet into the woods. Live boll weevils were found in each of the localities where trash was examined, the numbers ranging from 726 to 13,804 per acre with an average of 3,582 weevils per acre, as compared to 1,476 weevils per acre in samples collected in similar localities in 1938. At Tallulah, La., where the minimum temperatures were lower and the rainfall higher than at Florence, S. C., during the winter of 1938-39, G. L. Smith, A. L. Scales, M. T. Young, and G. L. Garrison examined 236 square yards of surface soil, leaves, and trash taken from 10 localities. Live boll weevils were found at the rate of 225.5 weevils per acre, as compared to 186 weevils per acre in the spring of 1938; 50 per acre in 1937; and 140.8 per acre in 1936. Heavy rainfall in January and February 1939 flooded many acres in Madison Parish, La., where these studies were made, and the effect of water standing on the soil surface in reducing the population of hibernating weevils was noted in the surface-trash examinations made in the fall of 1938 and in the spring of 1939. In the fall 22 live weevils were found in 32 square yards of surface trash on 1 plantation. Much of the soil on this plantation was covered with water several times during January and February, and in March only 1 live weevil was found in 48 square yards of surface trash. On another plantation, where the ground was flooded several times during the winter, 9 live weevils were found in 32 square yards of surface trash in the fall and none were found in 28 square yards of trash in the spring; but on another part of this plantation where the water did not stand on the soil surface, 11 live weevils were taken from 32 square yards of surface trash in the fall and 7 from 52 square yards in the spring. At Gainesville, Fla., C. S. Rude and L. C. Fife examined 66 square yards of surface soil, leaves, and trash, most of which were taken at the edge of a cotton field, and found boll weevils at the rate of 733 per acre. No previous records from Gainesville are available for comparison.

Hibernation of boll weevils in Spanish moss.—The results of fall and spring examinations of Spanish moss collected in the vicinity of cotton fields in Madison and Tensas Parishes, La., during the 14 years 1925-39 are reported by R. C. Gaines, et al, of the Tallulah, La., laboratory, as follows:

Winter of	Live weevils per ton of moss	
	at time of examination in	
	Fall	Spring
	Number	Number
1925-26-----	280	0
1926-27-----	242	4.0
1927-28-----	21	1.0
1928-29-----	240	3.8
1929-30-----	189	.2
1930-31-----	49	33.0
1931-32-----	724	462.3
1932-33-----	881	1.3
1933-34-----	365	40.8
1934-35-----	192	5.2
1935-36-----	19	0
1936-37-----	141	23.0
1937-38-----	51	1.4
1938-39-----	4	6.7

This spring 1,780 pounds of moss were examined, and 6 live weevils, or 6.7 per ton of moss, were found. From this table it is seen that the 4 weevils per ton last fall was the smallest number found since records were started in 1925, while for the spring examinations there are only 4 years in which a larger number has been found than in 1939. The winter of 1938-39 was rather mild, with the exception of one cold spell in November, when a minimum of 15° F. occurred. The fall collection of moss was made after this low, and the temperature did not go as low as 15° again during the winter. In the fall examination of moss 94.3 percent of the weevils found in the moss were dead, whereas in the spring examination only 64.7 percent were dead. This unusual condition was due to the fact that the Spanish moss for the fall examination was collected immediately following and during a period of extremely cold weather for that region. The low temperatures caused the high mortality of 94.3 percent of the weevils. During the winter many of the dead weevils fell out of the moss so that when moss was collected for the spring examinations only 64.7 percent of the weevils remaining in the moss were dead. In general, the number of weevils per ton of Spanish moss in the fall is an index as to the abundance of the weevils that developed in nearby cotton fields during the fall months; and the number of weevils per ton of Spanish moss in the spring depends on the number there in the fall, and on the weather conditions, especially temperatures, during the winter. In all previous years the spring examinations of Spanish moss have shown that there was a marked reduction in the number of live weevils, as compared to the fall examinations. This is what would be expected as many weevils are killed by low winter temperatures. If the fall examination in 1938 had been made prior to November 25, the number of live weevils would have been much larger than 4 per ton of Spanish moss. The coldest weather of the past winter at Tallulah, La., occurred on 5 days beginning November 25, 1938, when minimum temperatures of 19°, 20°, 18°, 15°, and 21° were recorded. There was probably no real increase during the winter in the number of live weevils per ton of Spanish moss, but there is an apparent increase because the sample of 1,039 pounds of Spanish moss collected on November 28, 29, and 30 was not large enough to accurately indicate the number of live weevils per ton of Spanish moss.

Development of pink bollworm larvae in relation to age of cotton squares.---

While studying the biology of the pink bollworm at the Presidio, Tex., laboratory, S. L. Calhoun and L. C. Fife made observations on the larval development in relation to the age of the cotton square. In June, when cotton first began to fruit, squares were tagged so that their age was known. Newly hatched larvae were placed on the squares when they were 10 and 11 days of age and the squares enclosed in cellophane bags. A month later the same procedure was followed with squares 16 and 17 days old. The mean air temperatures, as recorded by a thermometer, were 85.9° and 84.6° F. for the two periods. Squares which were 10 and 11 days old when infested were removed on the date of blooming or when they shed prior to blooming as a result of feeding by the pink bollworms. Squares which were infested when 16 and 17 days old were removed after 7 days, regardless of date of blooming. The removed squares were placed in individual vials in the insectary with sufficient water for completion of insect development. The average feeding time of the larvae in the older squares was 7.08 days and in the younger squares, 12.42 days. The complete cycle from egg deposition to emergence of adult was 22.57 days for larvae developing in squares 16 and 17 days old and 28.33 days for larvae in squares 10 and 11 days old at the time feeding began. The difference of 5.34 days in the developmental period occurred almost entirely in the larval stage, as there was only a slight difference in the prepupal and pupal stages and the incubation period was identical in the two series. The larval feeding period was adjusted to the development of the squares so feeding was completed or almost so at the time the flowers opened. The upper and lower age limits of the squares in which pink bollworm larvae can develop were not determined. In cotton bolls the developmental period averages approximately 33 days. Thus the appearance of the squares earlier in the season, and the shorter larval development period permit six generations a year in squares, whereas only three and a partial fourth generation develop in bolls.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Control work in the Big Bend of Texas.---The 2-year special control program for the Big Bend of Texas and adjacent areas in Mexico, for the purpose of reducing the heavy pink bollworm infestation, gives promise of a very successful outcome. This plan, which called for the early planting of the 1938 cotton crop, followed immediately by the clean-up of fields, with a delayed planting date until April 20 for the 1939 crop, is being carried out with splendid cooperation on both sides of the Rio Grande. Farming operations have made excellent progress in all sections during March in regard to having the land in readiness by the April 20 planting date. Most of the farmers express the belief that, so far as the pink bollworm is concerned, they have excellent prospects for a good crop. The next step in this program will be to endeavor to prevent any stub cotton from fruiting prior to the fruiting of field cotton. Indications are that there will not be a great deal of this menace, after the severely cold weather of last winter. An effort is being made to interest farmers in this phase of the work so that they will cut all stubs out at the time field cotton is chopped; however, this matter will be watched closely and no stub cotton will be allowed to remain in the fields. In the Ojinaga district, on the Mexican side of the river, the inspector in charge is withholding all cottonseed until planting time. Mexican inspectors have contacted each section of the district, advising their farmers of the planting date and instructing them to keep out the stub cotton. They expect to keep close inspection as the season advances to see that this is being done; however, in other than abandoned fields, little difficulty is anticipated.

Pink bollworm eradication in Salt River Valley of Arizona.--The winter field clean-up campaign which has been in progress in the Salt River Valley since December, on account of the finding of pink bollworm infestation in that area early in the fall of 1938, was brought to a close on March 10. This work consisted of cutting all 1937-38 cotton stalks and cleaning of fields, as well as an educational campaign carried out with the aid of the Division's motion picture portraying the work of this project, with reference to the benefits which should accrue to farmers by delaying the planting of short-staple cotton until April 10 and allowing no stub cotton to fruit, either in cultivated fields or on land laid out on account of A. A. A. allotments. After the initial program was completed, the rest of the month was devoted to an intensive drive to destroy all stubble, as warm weather during most of March gave a decided impetus to the growth of such cotton plants which, under favorable conditions, will begin to bear squares in 30 days or less. Contact work with farmers has been continued without let-up, and practically all are cooperating wholeheartedly in the entire program. Cutting of stalks has also been continued in additional territory. A spring clean-up and control program, having as its objective the destruction of all cotton stalks and stubble on land which will be laid out in 1939 in the area susceptible to infestation by short moth flight from known infested fields in the Gilbert area of the Salt River Valley, will begin on April 10.

Control work in the lower Rio Grande Valley of Texas.--Cotton planting in the quarantined area of the lower Rio Grande Valley, where infestation of the pink bollworm was first found in 1936 and where a special control program has been carried on since that time, was practically completed at the close of March. Throughout most of this area there was a deficiency of moisture during March, in both irrigated and nonirrigated lands, which materially retarded the growth of cotton. This is probably aiding the program for pink bollworm control, because it has the effect of a delayed-planting date, which is one of the requirements in the Big Bend and in Arizona. A retarded-planting date has not been required for this valley because of the difficulties of getting a stand of late-planted cotton. With the appearance of a considerable quantity of blooms on old stalks in this lower Rio Grande Valley quarantined area, field inspections were begun, to determine whether the pink bollworm could be found. Inspections were first concentrated in the area around Brownsville, where infestations were heaviest last season, and later on the Mexican side along the new highway, where last season's stalks had been left for a distance of several miles. During the month a total of 17,824 forms, consisting of squares, blooms, and bolls, taken from 17 fields, were examined on the American side, showing negative results as to pink bollworm infestation and an average boll weevil infestation of 20 percent. In Mexico 9,714 forms were examined, with an average boll weevil infestation of 33 percent, but no evidence of pink bollworm infestation was found.

Wild-cotton eradication in southern Florida.--The work of eliminating the pink bollworm from southern Florida, in order to prevent it from reaching the main Cotton Belt, by destroying its host, wild cotton, was carried on with excellent progress in all areas. The second cleaning of the season was well under way in all sections at the beginning of March. More than 6,000 acres was scouted for wild cotton plants along the west coast during the period and the work of clearing vegetation from wild-cotton colonies, for the purpose of admitting sunlight and air to hasten the germination of cottonseed, was also continued along the west coast. The first cleaning of Sound Point, the Dade County Mainland, and Long Key,

was completed during the latter part of March. These were the last three sections in the district to be cleaned for the first time this season. During the month approximately 40 acres was cleaned for the first time. Practically all this acreage was in the Cape Sable section and was located during the aerial survey. Most of the wild cotton plants removed from this area appeared to be about 2 years old, and it is believed the seed was disseminated during the 1935 hurricane. Work inaugurated in January in the Cape Sable area, where practically half of the total wild-cotton acreage in southern Florida is found, was brought to a temporary close on March 28, owing to exhaustion of funds set aside for wild-cotton eradication in that section. The camp and all equipment was left intact in order that operations could be resumed promptly if additional funds were made available. At the time operations were suspended, between 55 and 60 percent of the area had been cleaned for the second time. During this second recleaning only a small number of fruiting wild-cotton plants were found.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Effect of hot-water treatment on flowering of narcissus bulbs in Pacific Northwest varies with region of origin.--Records made upon the production of flowers by narcissus bulbs grown in several sections of Oregon and Washington and which had been given the hot-water treatment used ordinarily in combating the narcissus bulb fly (*Merodon equestris* (F.)) and the bulb nematode (*Ditylenchus dipsaci* (Kuhn) Filipjev), and then forced in the greenhouse, indicated that the bulbs from the more southern regions were affected by the treatment to a lesser extent than those from the more northern regions, according to a report submitted by C. F. Doucette, of the Sumner, Wash., laboratory. The bulbs were treated early in the summer of 1938, 6 to 8 days after being dug, then were dried and placed in storage throughout the summer at the Sumner laboratory. In the fall they were planted in flats and handled in the same manner as greenhouse forcing stocks in commercial practice. When the bulbs bloomed the flowers were graded on a scale of 1 to 10, in which grade 1 represented a perfect flower. The average grades of the flowers from the several lots were as follows:

Production region	Average grade of flowers from--	
	Treated bulbs	Untreated bulbs
Oregon:	:	:
Curry County (1)	:	:
(southern coast)-----	2.78	1.28
Curry County (2)	:	:
(southern coast)-----	1.67	1.38
Washington:	:	:
Clark County	:	:
(southern Washington)-----	3.50	1.25
Pierce County	:	:
(lower Puget Sound)-----	6.45	1.17
Skagit County	:	:
(northern Puget Sound)-----	4.41	1.08

Late-season treatments of the same stocks were made also on September 24, 1938, primarily for comparison with the flowering performance of imported bulbs. In recording the results of these late-season treatments it was found that the flowers were aborted on practically all of the bulbs grown in the Pacific Northwest, but the treated imported bulbs produced practically as many flowers as the untreated, indicating that the bulbs imported during the fall of 1938 are less affected by the hot-water treatment than any of the domestic stock included in the experiment.

Sweetpotato weevil adults survive winter under unfavorable conditions.-- K. L. Cockerham and O. T. Deen, of the Sunset, La., laboratory, report that, as a result of experiments performed during the fall and winter of 1938-39, it was found that adults of Cylas formicarius (L.) are able to survive the winter under unfavorable conditions. Up to the end of March 3 female C. formicarius adults had lived 126, 128, and 129 days, respectively, without food, in cages located on a typical headland containing only grasses and weeds. The grasses and weeds in this cage were known not to be host plants. This is the second year that a small percentage of C. formicarius adults have survived the winter season without food, starting from the time of harvest during the preceding season until the time of the season when the sweetpotato plants were sprouting in the seed beds. In another series of experiments adults of C. formicarius were collected from the cleaned area of sweetpotato fields for slightly more than 1 month following the clean-up, indicating that such adults could exist for some time without the shelter of host plants or other host material. It was demonstrated, however, that nearly all of the sweetpotato weevil adults left the cleaned area of the field under observation within a period of 30 days after the expiration of the clean-up and none of the weevils placed in cages on the cleaned area, without protection or food, survived the winter. Weevils emerged throughout the winter from sweetpotatoes exposed to winter freezes and also from sweetpotatoes covered with soil. The weevil emergence, as well as the decay of the potatoes, was much more rapid in the potatoes left on the surface of the soil than in those covered with soil. Many living specimens of the sweetpotato weevil in all stages were found in sweetpotato crowns and tubers taken from the field each month during January, February, and March. These results demonstrated that sweetpotato weevil adults will survive in sweetpotatoes, even after the latter have been exposed to severe freezes; hence it is necessary to remove from cleaned-up fields not only the sweetpotatoes but also any green material of the plant which may remain.

Undisturbed tobacco fields provide favorable overwintering quarters for flea beetles.--Intensive studies on the hibernation of the tobacco flea beetle (Epitrix parvula (F.)) by Clemence Levin, of the Oxford, N. C., laboratory, disclosed that last winter the greatest number of adults of the flea beetles were found in dead grass near old tree stumps in an undisturbed tobacco field. As many as 110 flea beetles were taken from a single square-foot sample in this environment late in March. The hibernation studies indicated further that the flea beetles were apparently well distributed over the wooded area where tobacco-plant beds were located and that tobacco stalks of the 1938 crop characterized by the presence of debris from suckers appeared to harbor more flea beetles than stalks that were not accompanied by such debris.

In southern Idaho high beet leafhopper populations may be expected in fields near breeding areas.--According to reports submitted by J. R. Douglass and his associates, of the Twin Falls, Idaho, laboratory, it appears, on the basis of conditions in February, that high populations of Eutettix tenellus (Bak.) may be ex-

pected during the coming season in the beet-growing areas located near the leafhopper breeding grounds of southern Idaho. These conclusions were based on the following determinations, made in a study of beet leafhopper conditions in the area indicated, beginning with the spring of 1938: (1) An unexpected situation occurred on warm days of April and first part of May 1938, when a large number of overwintered leafhoppers moved into the cultivated areas. Undoubtedly this large movement of overwintered leafhoppers, together with the premature drying of annual spring-breeding host plants in certain areas, affected the magnitude of the spring generation, which was approximately one-third as large as in 1938. Above-normal fall temperatures in 1937, with sufficient precipitation, permitted a good germination of downy chess grass, not a host of the beet leafhopper. Excessive precipitation in March 1938 permitted a much more dense and widespread germination of this plant, which resulted in excellent stands of the downy chess grass in certain areas ordinarily occupied by Russian-thistle. Dense stands of downy chess grass intermixed with Russian-thistle, the most favorable summer host plant, reduced the suitability of such areas for the reproduction of large numbers of leafhoppers. The unfavorable situation with respect to the summer host plant complex, plus a low population of leafhoppers in the spring, were important factors in the production of the lowest fall population of leafhoppers recorded during the last 5 years. (2) Weather conditions during October 1938 were generally ideal for widespread germination of mustards, which constitute the principal host plants of the beet leafhopper during the fall and winter. The first killing frost in southern Idaho occurred on October 18, 1938. Consequently, the beet leafhopper left its summer and holdover host plants with little delay and entered the winter under favorable conditions. (3) Fall surveys in the Sailor Creek sagebrush area demonstrated the presence of the lowest late-fall population of beet leafhoppers during the last 4 years. (4) The winter of 1938-39 was comparatively mild and dry, which permitted a high percentage of winter survival of the existing beet leafhopper population, as confirmed by recoveries obtained in hibernation cages. (5) Experience has shown that an early spring advances the date of leafhopper movement from the breeding grounds into the cultivated areas. It is possible, however, that if a cool, wet spring develops, similar to that of 1938, this movement into the cultivated areas will be delayed and reduced in magnitude. (6) Regardless of conditions, high populations of the beet leafhopper may be expected to occur in beet-growing areas situated near the leafhopper breeding grounds. (7) Since spring conditions affect leafhopper populations profoundly, as well as the time of their movement into the beet fields, a second statement, based on studies made in the field during the spring, will be issued later.

INSECTS AFFECTING MAN AND ANIMALS

Development of blowfly traps.—At the Uvalde, Tex., laboratory, several types of fly traps are being tested in the field, and others are under design and construction. Preliminary work indicates the feasibility of returning captured flies to the bait pan, thus using them as accumulative bait. Using the above principle, a standard cone trap was converted into a self-emptying type. This trap is in use and is being checked with a regulation trap. Another trap of similar design, but intermediate in size between the standard cone trap and the large box trap, has been constructed and placed in operation. The design of this trap was based on practical demands to reduce labor and attention required, to make it self-emptying, and to use the captured flies as additional bait. If the performance of this trap is entirely successful its operation will be almost continuous and automatic. In

shape and size it is cylindrical, 28 inches in diameter by 48 inches high. A No. 3 galvanized tub is used as a bait pan. Neither of the above traps has been in operation long enough to report results.

Control of short-nosed ox louse.--O. G. Babcock, of the Sonora, Tex., laboratory, reports apparent control of Haematopinus eurytetrus Nitz. by the use of a dip consisting of 100 pounds of wettable sulphur and 10 pounds of cube powder, containing 5 percent rotenone, to 1,000 gallons of water.

Control of cattle grubs.--R. W. Wells reports the results of a series of tests on the use of derris and cube washes on the backs of cattle for control of cattle grubs in Colorado and Iowa. Using derris and cube washes (16, 12, 8, and 4 ounces, and 4 ounces of soap per gallon of warm water) on the backs of cattle, it was found that 1 quart is sufficient to treat only 3 animals with such winter coats as are found in Colorado and Iowa. After distributing the powdery wash over the back it was found essential to devote 2 man-minutes of rubbing the wash into the hair with the hands. Rubbing with a brush is less efficient. Twelve ounces of the powder per gallon of wash is as efficient as 16 ounces with an equal amount of rubbing. Eight ounces of powder per gallon with the 2 man-minutes of hand rubbing was survived by approximately 9 percent of the grubs, whereas with 16 ounces per gallon the best result was a survival of 3.15 percent. The powders were reported by the Division of Insecticide Investigations to contain rotenone and extractives as follows: Derris, 5.2 percent rotenone and 15.5 percent total extractives; cube, 4.7 percent rotenone and 21.1 percent total extractives. In all, 186 cattle were used, each being handled twice, first for application of the wash and secondly for extraction of the grubs totaling 4,708. The cube powder gave better results than the derris powder.

Detachment of betfly eggs from horsehair.--S. W. Simmons, of the Ames, Iowa, laboratory, has found that eggs of Gastrophilus nasalis (L.) and G. intestinalis (Deg.) can be successfully removed from horsehair by treatment with trypsin. A 1/2-percent aqueous solution brings about detachment in from 6 to 7 hours, operating at 38° C. and at a pH of 7.2-8.0. The time is increased to 24-30 hours by decreasing the strength to 1/4 percent. Even a 1/16-percent solution is effective, but requires 50 hours to remove the eggs. After treatment a strong spray of water is advisable to force off eggs that have been loosened but which have failed to drop. Tests of breaking strength and visual examination for changes in elasticity indicated no injury to the hair by trypsin. Boiling hydrochloric acid is effective for egg removal. This may be used in strengths of from 2 to 10 percent. The more concentrated gave quicker results, causing detachment in from 12 to 20 minutes. Serious effect on the hair from the acid treatment was not noted, although it is known that long exposure of horsehair to hydrochloric acid affects tensile strength, swelling, and birefringence. Sulfuric, nitric, and formic acids were unsatisfactory. None of the other agents tried were effective. Horsehair detached from the animal has many commercial uses. The presence of attached betfly eggs detracts from its value in many instances.

Treatment of screwworm wounds.--Roy Melvin, of the Menard, Tex., laboratory, reports that a semifield test for treatment of screwworm cases, in which diphenylamine and diphenylamine conditioned with sugar and boric acid were used, was completed. The protection was excellent with all three treatments. The healing records did not show any marked difference between treatments.

FOREIGN PARASITE INTRODUCTION

White-fringed beetle investigations in South America.—Since his arrival in Argentina in September 1938, F. A. Berry has been making a study of the status of the pest and of related species and has also conducted a search for natural enemies. Naupactus leucoloma Boh. was found to occur quite generally in Argentina, Uruguay, and southern Brazil. In general, the species is not sufficiently abundant to be a crop pest. The highest populations were found in the more arid regions. The heaviest infestations of grubs were almost invariably found in unirrigated alfalfa, but in most cases these were of a related species, N. densus. At times considerable areas of this crop are completely destroyed. A striking feature of these infestations is that the center of infestation within a field shifts from year to year and consequently there is seldom an abundance of grubs at the same point in successive years. Evidence on this point was revealed by an examination of feeding scars on the main roots in the older fields. Many fields showing heavy previous feeding were almost entirely free from infestation when examined. Observations were begun in Uruguay in January 1939, and the pest appears to be more abundant and uniformly distributed in that country than in Argentina. Thus far no indications of the occurrence of parasites or specialized predators have been found in either country.

FOREIGN PLANT QUARANTINES

Stopping them at the line.—A Mexican was apprehended on March 31 by Messrs. Phillips and McCoy, immigration border patrolmen, after he had illegally entered the United States from Mexico in the vicinity of Brownsville, Tex. At the time he was apprehended this Mexican had in his possession 58 avocados with seed in them. Upon questioning, he admitted he had waded the river and was bringing the avocados over to give to a friend. He also stated that he knew he was doing wrong by wading the river and bringing the avocados in. He was fined upon by the immigration authorities under Section 2 of the Immigration Act on the charge of illegally entering the country. When the charge of smuggling prohibited fruit was brought to the attention of the United States district attorney of Brownsville, it was decided that, inasmuch as Federal Judge Allred was to hold court in Brownsville on April 1, it would be best not to file on this Mexican but merely to have him appear individually before the judge and have the plant-quarantine violation explained, along with the immigration charges. The judge's decision was: "I sentence you to 90 days in jail, and I want you to understand that I would suspend the sentence had you not had the avocados in your possession. This country must be protected against insect pests." Incidentally, the avocados were found to be infested with larvae of Conotrachelus sp.

Cactus plant intercepted in mail.—While examining foreign mail at Laredo, Tex., an inspector picked up a newspaper which was rolled up as usual for mailing. The feel of the paper was a little unusual and the roll not quite so round as would be expected. Upon investigation, it was found that a square had been neatly cut out and removed through several thicknesses of the inside of the paper, thereby making a fine boxlike hiding place for a small cactus plant. The parcel was called to the attention of the customs inspector and seized as smuggled goods.

Straw jackets.—Scotch whisky may be "Christmas spirits" for some but it is "bugs" for the plant-quarantine inspectors at Mobile. This was revealed after the schedule and itinerary of the American S. S. City of Alma was speeded up and

chanred in order to get 10,220 cases of whisky, wine, and various liquors into port, to be forwarded by rail to the Midwest for Christmas sales. The vessel arrived at Mobile on December 14 and inspection of the cargo after it had been placed on the dock revealed that 2 lots, consisting of 1,050 cases, were packed in straw jackets contaminated with vetch, in the seeds of which living specimens of Bruchus luteicornis Ill. were found. The importer's representative employed 15 laborers to replace the infested straw. They worked 8 hours the first day and 6 hours the following day at this operation. The jackets made 5 large truckloads. They were removed to a nearby spot and destroyed by burning.

Pink bollworm larvae in mail from Italy.—During the procedure of appraising a mail shipment of fancy pillow covers and dresses from Italy, addressed to a local resident in San Jose, customs appraiser Lester Johnson at San Francisco noted the presence of a very small tuft of cotton with a few adhering seed. Immediately he held the entire shipment for the attention of the plant-quarantine inspector. When examined by him, approximately 30 cottonseed were found. These were infested with live larvae of the pink bollworm (Pectinophora gossypiella Saund.). There was nothing to indicate whether the presence of the cotton was intentional or accidental. The sender may have innocently included it, knowing that cotton is grown in California and thinking the addressee might care to try this seed. It was only the alertness of the appraiser, and his interest in fully cooperating with other governmental agencies, that prevented the delivery of a shipment which might have been the means of introducing a major insect pest to a new area.

Fruitfly in officer's quarters.—During the recent inspection of officers' quarters on a Hawaiian passenger liner at San Pedro, three figs infested with larvae of the Mediterranean fruitfly, were found in the Third Officer's room. A careful search of the room failed to disclose any larvae; however, in order to safeguard against the possibility of larvae having emerged and crawled into crevices, the room was carefully sealed and fumigated with hydrocyanic acid for 1 hour.

Notes on nematodes.—Ginger rhizomes from Peru entering under special permit at San Francisco were inspected on September 7, 1935, and approximately 35 percent of them showed decay, in which nemas were present. Material was submitted to the Division of Nematology for study and the findings are published in a paper by G. Steiner and J. R. Christie (Proc. Helminthol. Soc. Wash. 6:26-28, Jan. 1939). Three species of nema were found: Diploscapter coronatus (Cobb) Cobb, Neocephalobus peruensis n. sp., and Aphelenchoides huntii Steiner. The first named is found in ginger in various parts of the world but its status is not known. A. huntii was intercepted in husk tomato from Mexico and lily bulb from Japan (Bur. Ent. & P. Q. News Letter, vol. 3, no. 1, p. 24, Jan. 1936). Studies of this species as found on the ginger rhizomes from Peru show that it is parasitic on fungi. N. peruensis Steiner and Christie feeds on bacteria, judging by the contents of the intestine, although the numerous bacteria present in the end portion of the intestine showed no changes attributable to digestive action and apparently had not served as food. Rhynchostylis retusa stems of six plants in cargo from Ceylon were found to be infested by Panagrolaimus subelongatus (Cobb) Thorne, Aphelenchoides parietinus (Bastian) Steiner, and a form that was at first taken to be Ditylenchus dipsaci (Kuhn) Filipjev. Detailed study has shown that the latter is closely related to Ditylenchus intermedius (de Man) Filipjev, but further material must be studied before it can be determined whether or not it is a new species. Any nemas found in

tropical material and having the appearance of D. dipsaci should be forwarded for study by the Division of Nematology.

Pathological interceptions of interest.--Albugo bliti (Biv.) O. Kuntze was intercepted on amaranths from Cuba on February 13 at Miami. Bacterium savastanoi E. F. S. was intercepted on olive cuttings in baggage from Portugal on March 30 at New York. Colletotrichum lagenarium (Pass.) Ell. and Hals. was intercepted on March 7 at New York in a shipment of Momordica charantia from Cuba. Cytospora sacchari Butl. was intercepted at New York on March 16 on sugarcane cuttings in baggage from Syria. C. vitis Mont. was intercepted on grape cuttings in baggage from Greece on February 23 at New York. A disease intercepted on tomato in baggage from Mexico on February 15 at Brownsville has been determined as Helminthosporium tomato Ell. and Bart., since it fits the description, but it might well be put in the genus Brachysporium. Leptosphaeria inanotoi Miyabe was found March 13, at New York on rice hulls used as packing in a mail package from Japan. Melanconium sp. on Cymbopogon citratus leaves from Puerto Rico, intercepted at New York on February 21, does not seem to fit any of the named species. Posta-lozzia macrotricha Klob. was intercepted at New York, on March 1 on leaves of an azalea plant in baggage from Italy. Phoma auerswaldii Allesch. and Phoma stictica B. and Br. were intercepted on February 1, at San Francisco on box plants in special permit shipments from Holland. Puccinia graminis Pers. found on wheat straw jackets on wine from Spain and collected at Detroit on March 27 was of interest in that from 20 to 25 percent of the teliospores were 3-celled.

Entomological interceptions of interest.--A living larva of the Mexican fruitfly (Anastrepha ludens Loew) was intercepted at Laredo, Tex., on January 14 in a tangerine in baggage from Mexico. Three hundred and twenty-six larvae of the fruitfly Anastrepha mombinpraeoptans Sein were collected on September 13, 1938, in jobo (Spondias mombin) fruits in the field at Arecibo, P. R. Living larvae of the pyralidid Hellula phidilealis (Wlk.) were intercepted at New York on December 27, 1938, in the leaf stems of Swiss chard in cargo from Cuba. Living specimens of Aulacaspis crawii (Ckll.) were taken at San Francisco on January 9 on an unidentified plant in baggage from Japan. Adults of the hairy vetch bruchid (Bruchus brachialis Fahr.) arrived at Mobile, Ala., on October 4, 1938, in vetch seed in cargo from Sweden. Galls of the Philippine orange moth (Prays citri Mill.) were found at Boston on December 9, 1938, on pomelos (Citrus maxina) in ship's stores from the Straits Settlements. Specimens of the whitefly Dialeurodes decempuncta Quaintance and Baker were intercepted at Honolulu, T. H., on April 29, 1938, on a bulala oil tree (Nephelium mutabile) from the Philippines. Five living specimens of the earwig Euborellia plebeja (Dohrn) were taken at Blaine, Wash., on September 27, 1938, in packing material for lily bulbs in cargo from Japan. Living specimens of the coccid Orthezia praelonga Dougl. arrived at Nogales, Ariz., on November 15, 1938, on a walnut leaf in baggage from Mexico. A living larva of the European corn borer (Pyrausta nubilalis Hbn.) was collected on September 7, 1938, in a sunflower stalk in the field at Sinajana, Guam. Living soldiers and workers of Microcerotermes exiguus Hag. were intercepted at Washington, D. C., on November 4, 1938, on Brownia seed in the mail from the Canal Zone. This termite is recorded from Central and South America.

DOMESTIC PLANT QUARANTINES

Early grasshopper hatch expected.--Grasshopper eggs were in an advanced stage of embryonic development in many southern areas by the latter part of March, according to reports of field supervisors. The long period of warm weather last

fall prolonged the egg-laying period and partially incubated the eggs so that the hatch is expected after only a short period of warm weather. Farmers and county agents are encouraged to locate egg-beds of the migratory species in order that newly hatched hoppers may be baited promptly.

Grasshopper field offices established.---To facilitate the baiting operation in the approaching season, in the areas heavily infested with the migratory species of grasshoppers, suboffices of the field headquarters at Minneapolis are being established at Amarillo, Tex., Pueblo, Colo., Mandan, N. Dak., Aberdeen, S. Dak., Miles City, Mont., Glasgow, Mont., and Sundance, Wyo.

Workers organize for grasshopper control.---Owing to the necessity of greatly modifying the earlier tentative plans for extensive grasshopper baiting on range and idle lands, revised programs of control operations are now being worked out with the various States. The program as now planned provides for (1) adequate crop protection throughout the infested region as in past years; (2) Federal participation in the distribution of bait materials and assistance in control of grasshoppers on idle or reverted and abandoned farm land in restricted areas in Wyoming, Montana, North Dakota, and South Dakota, where local farm labor is inadequate to do the baiting; and (3) limited Federal participation in the control of migratorial hoppers on range land in New Mexico, Colorado, and the Panhandles of Texas and Oklahoma. Special conferences have been held at St. Paul, Minn., Dickinson, N. Dak., and Santa Fe, N. Mex. Organizational and educational activities of field supervisors and State leaders throughout the infested areas are progressing rapidly. Sixty Federal entomologists and field supervisors are now assigned throughout the region. Bait materials, sufficient to make 20,000 tons of mixed bait, have been purchased since January 1. This, with the carry-over from last year, makes available approximately 90,000 tons at this time. Shipping to points in the Southwest was begun early in April.

Mormon crickets hatching.---Mormon crickets were hatching at Pasco, Franklin County, Wash., on March 21, according to a report authenticated by the field project leader. The second week in April they were hatching in all 11 infested States and it is expected that control operations will be under way between April 15 and May 1.

Mormon cricket control plans.---Plans for conducting cooperative operations for the control of Mormon crickets in 1939 have been drawn up with the States of Oregon, Washington, Wyoming, Montana, Nevada, Idaho, South Dakota, and Utah. Thirty-five Federal entomologists and supervisors are now actively engaged with State leaders in organizational work throughout the area, and plans are being worked out, in turn, in the several counties participating in the work. The protection of crops from destruction is the primary aim of the program, as in 1938. The type of work will also be similar to that of last year. In general, it is proposed to reduce labor to a minimum by the use of power dusters. The use of barriers as a supplement to dusting will be encouraged. In several areas it will be efficient and economical to destroy cricket bands in or near breeding grounds early in the season before they migrate. Such early clean-up activities will also be attempted in certain areas where destruction of range plants by the crickets is severe and where it is believed they will migrate later to crop lands.

White-fringed beetle control activities.---The movement of restricted articles in March was light, except for the shipping of nursery stock from such centers as New Orleans and Mobile. Over 40,000 plants were moved, under authorization, from New Orleans nurseries to retail establishments, and over 4,000 permits were issued for movement of restricted products from the area. Two New Orleans nurserymen have fumigated nearly 46,000 square feet of soil in certified heeling-in areas. No adult white-fringed beetles had been seen at New Orleans since February 15, according to a field report dated April 6. For the movement of nursery stock from Baldwin and Mobile Counties, Ala., consisting chiefly of camellias and azaleas, nearly 700 permits were issued in March. Preliminary to active control operations, property owners in the infested areas are being contacted and permission is being obtained from residents of the various towns to proceed with such work. Farmers and home gardeners are, for the most part, adopting recommended cultural practices in spring planting. Limited inspection for larvae resulted in finding in March slight increases to known infested areas at Laurel, Miss., and Florala, Ala.

March work on the sweetpotato weevil.---The principal activities on sweetpotato weevil control in March were the cleaning of places of storage of sweetpotatoes on the infested properties, and those adjacent within eradication areas, making further inspections in such areas, destroying food plants on infested properties, and enforcing the quarantine regulations. Inspection was made of approximately 9,000 bushels of seed tubers in commercial storage at points in Texas, of which more than 2,000 bushels were sold in the eradication areas. These activities of the month were conducted jointly with the States in 5 counties in Georgia, 9 in Mississippi, 2 in Alabama, and 4 in Texas. Inspections were made on 417 properties, of which 19 were found infested. State-sponsored W. P. A. crews cleaned up infested premises in Baldwin and Mobile Counties, Ala., and trapped 1,092 weevils on 60 properties.

Spring inspections for peach mosaic.---With peach trees in full bloom in the Southern States in the first week in April, inspections for peach mosaic were begun in eastern Texas, to be extended a little later into the El Paso area and thence into California, Arizona, Utah, New Mexico, Oklahoma, and Colorado, with the assistance of these States. In accordance with the revised quarantines adopted by practically all States, it will be necessary to complete the inspection of the environs of nurseries and budwood sites prior to May 15.

Progress in peach-tree-removal work.---The month of March marked the destruction of over 1,270,000 peach trees which were diseased, abandoned, or escaped. Of special interest was the work in the Banning Heights District of Riverside County, Calif., where for the first time since the history of the project, all mosaic-diseased peach trees were removed. Many new peach orchards are being planted in this district and the growers are considering the forming of a pest-free area. Similar work for the control of the phony peach and peach mosaic diseases was conducted in March in Alabama, Arizona, Arkansas, California, Colorado, Georgia, Mississippi, South Carolina, Tennessee, Texas, and Utah, with an average of 646 relief laborers.

Progress in citrus canker eradication.---With a force of 5 to 8 Federal-State inspectors, 2 Louisiana parishes have been inspected since the work was resumed in that State on January 16, and 10 formerly infected properties were thoroughly reinspected. A great many trees of Citrus trifoliata, as well as

edible citrus of numerous varieties, were found on various estates and home sites on 2 islands off the coast of Iberia Parish. In Texas the Brazoria and Galveston County areas are being strip-worked by W. P. A. crews and inspectors, searching for escaped Citrus trifoliata seedlings. On properties where canker has been previously found the crews crawl over the entire properties in search of tiny trees of that species. Nearly 2,000 properties were inspected in the 2 States in the month ended March 25, and no canker was found. Nearly 114,000 abandoned citrus trees in Texas were destroyed.

Japanese beetle traps placed.--Through the Division of Cereal and Forage Insect Investigations, Japanese beetle traps are being forwarded for operation to 13 points in the South and West, where trappings may be observed.

Transit inspection work.--A truck strike in parts of three New England States the last week in March caused a tremendous increase in railway shipments through Boston, according to the transit inspector in that city. Fifty percent of the violations intercepted there in March consisted of forest-plant products. Boston and New York inspectors reported that nursery-stock shipping was very light in March, with the prolonged winter weather. Pittsburgh and Chicago inspectors reported a gradual incline since the first of the month, with Chicago shipments increasing in the latter half of the month four and one-half times the number in the first half, as reported by railway companies. Mail shipments increased four and one-half times over those in February. The inspection force in New York City was increased in the early part of March by the assignment by the Japanese beetle control office, of two inspectors to check the spring movement of nursery stock. Violations intercepted in New York in March included two on which the void date of the Japanese beetle certificates had been changed by someone other than the certifying inspectors. The shipments were turned back and investigation is being made.

Air-mail shipments checked.--Air-mail shipments of cut flowers reported in transit at the Chicago airport in March totaled 236. They originated in 19 States, Canada, and Hawaii and were consigned to 25 States and Canada. Officials of the Air-Mail Field Terminal at Chicago make a practice of reporting such shipments by telephone to the transit-inspection office in that city, for such inspection as may be desired.

Citrus whiteflies intercepted.--E. A. Burns, transit inspector in charge at New York City, recently found flies in a shipment of gardenias from a Georgia greenhouse, which were determined as Dialeurodes citri Ashm.

Quarantine changes.--Circulars of the B. E. P. Q. series have recently been issued as follows: Nos. 492, 493, and 494, lifting certain treatment requirements for the pink bollworm of cotton, and No. 495 relating to the Mexican fruitfly, extending the harvesting season for grapefruit and requiring sterilization of such fruit after April 11, 1939.

INSECTICIDE INVESTIGATIONS

New insecticides and fungicides.--The high insecticidal value of carbon disulfide has been known for many years. Recently, certain derivatives of carbon disulfide, called xanthates, have been tested for pest control and some of these have been found to possess considerable value. R. H. Carter, of this Division, on

March 14, 1939, was granted U. S. patent 2,150,759, which covers the composition of a fungicide with a compatible insecticide, said composition comprising cuprous amyl xanthate as its essential active fungicidal ingredient and di-amyl xanthogen as its essential active insecticidal ingredient, in the approximate molecular ratio of two to one, respectively. This composition has given promising results in preliminary tests against the tobacco hornworm, the southern armyworm, the cross-striped cabbage worm, and the imported cabbage worm. In laboratory tests it was also found toxic to the organisms of peach brown rot and apple bitter rot. Spraying tests were made on the foliage of certain trees. After several weeks' exposure no burning was evident on apple, pear, or lilac, but peach foliage was slightly injured.

BEE CULTURE

Weather factors have dual influence on honey production.--It has long been known that weather factors exert a dual influence on honey production by affecting both nectar secretion and flight activity of bees, but it has not been possible to separate clearly or evaluate the relative importance of the two phases of this influence. An intensive study several years ago on the effect of weather factors on the flight activity of honeybees marked the beginning of an effort by the Bureau to solve this problem. This effort is now being continued at the Pacific Coast Bee Culture field laboratory in Davis, Calif., by a study of the effect of weather and other external factors on nectar secretion. The poinsettia is the principal plant being used in this investigation since it is readily grown under controlled greenhouse conditions, has large exposed nectaries, and furnishes appreciable amounts of nectar. The work is in charge of G. H. Vansell who reports as follows concerning preliminary observations:

"Temperature--It is evident that temperature has a profound influence on nectar secretion in poinsettia blossoms. Plants taken to the bee house, where the night temperature dropped to from 45° to 47° F., entirely ceased to secrete after the first 24-hour period. In the 'cold room' of the greenhouse without artificial heat from 5 p.m. to 8 a.m. the quantity of nectar secreted was but a fraction of that in the warm room. The door was open between the two rooms from 8 a.m. to 5 p.m., so that the day temperatures, even on days without sun, were much above those in the bee house. During sunny days the 'cold room' became much warmer than the minimum in the warm room.

"Humidity--Humidity greatly influences the quantity of nectar per blossom, but the sugar content diminished with the quantity increase. When the relative humidity was near 100 percent (inside a sweating glass container) the sugar concentration was from 12 to 15 percent, whereas at times under warm room, greenhouse conditions in midafternoon of a sunny day it reached 60 percent. The influence of humidity on nectar concentration for one period (December 8) is shown in the following table:

Position of plant during last 24-hour period	Sugar : concen- : tration : in nectar	Temperature : : °F.	Relative humidity	Remarks
Sweating glass box in warm room----	12.8	70, thermograph	Probably near 100	Reading taken con- secutively, fog hides sun.
Fully exposed in cold room--	28.5	48, approximately	Higher than in warm room	Reading taken con- secutively, fog hides sun.
Fully exposed in warm room--	61.6	70, thermograph	70 by hygro- graph	---

"Air pressure.--Plants were simultaneously subjected to normal air, positive, and negative pressures in the warm room. The positive and negative plants were reversed in due course. In all but one instance plants under pressure apparently yielded an increased quantity of nectar and sugar.

"Light.--Exclusion of light by surrounding glass boxes with two thicknesses of light-excluding black cloth stopped nectar secretion after 24 to 36 hours. Not only did secretion cease, but the nectar lips moved together, closing the cup. Removal of a cessated plant to the light caused reopening of the cups with revival of secretion.

"One thickness of cloth (partial light) was insufficient to stop secretion although the quantity was greatly reduced. Subsequent exposure to full light revived secretion to equal that in the check plants. Actual sunlight did not appear necessary for nectar secretion, as partially darkened plants secreted as did the general lot during several days of fog.

"Daily fluctuation in nectar secretion.--Unequal quantities of nectar were harvested from day to day. Secretion was evidently most copious at night following unclouded days, but was nearer equal each 12-hour period (8 a.m. to 8 p.m.) during foggy periods. Temperature may have contributed to this, as the warm room temperature during sunny days was far above the average for the nights and foggy days. The difference between night and day secretion was greater than the following table indicates as the actual dark period at this season is much the longer. The nectar produced during day and night periods for 3 days, beginning December 16-19, 1933, was as follows:

Plant	Day : 8 a.m.-: 6 p.m.	Night : 3 p.m.-: 3 a.m.	Day : 8 a.m.-: 3 p.m.	Night : 3 p.m.-: 3 a.m.	Day : 9 a.m.-: 7 p.m.	Night : 7 p.m.-: 8 a.m.
(Plant X):						
Amount (milligrams)-----	2.4	3.0	1.6	3.2	2.25	2.5
Concentration (percent)-----	55.7	33.5	55.0	37.0	40.70	27.1
(Plant Y):						
Amount (milligrams)-----	1.9	2.5	1.9	3.0	1.60	1.7
Concentration (percent)-----	59.1	44.5	60.4	50.3	43.20	34.0

"Variation in concentration of nectar in different plants---Data were obtained on four plants sampled simultaneously on four consecutive days. Unfortunately, the humidity data cannot be correlated because the hygrograph was found to be registering improperly at the time. Irrespective of this, however, these plants were side by side in the warm room. The sugar figures were obtained by a refractometer without temperature correction, but again the daily readings were immediately consecutive and therefore at the same temperature, practically speaking. The data on sugar concentrations in different poinsettia plants are shown in the following table.

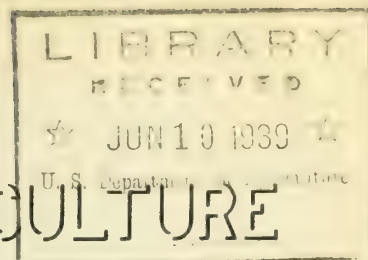
Plant No.	Sugar concentration on---			
	Nov. 30:	Dec. 1:	Dec. 2:	Dec. 3
	Percent:	Percent:	Percent:	Percent
5-----	54.0	56.2	57.3	47.0
6-----	40.3	45.2	43.6	38.5
7-----	43.3	47.0	45.2	37.6
8-----	46.0	47.6	46.8	39.7 "

IDENTIFICATION AND CLASSIFICATION OF INSECTS

The proper name for the corn ear worm---For three-quarters of a century (1826-1903) the corn ear worm was known as Heliothis armigera (Hubner) and had an extensive, economic literature under that name. It was figured originally as Noctua armigera by Hubner between 1803 and 1808 (Samml. Eur. Schmett. Noctuae, pl. 79, fig. 370). In 1826 it was referred to Heliothis Ochsenheimer (1816) by Treitschke (Schmett. Eur. vol. 5, pt. 3, p. 215). The combination was not disturbed until 1903, when Hampson (Cat. Lep. Phal. B. M., vol. 4, p. 45) rejected Ochsenheimer's genus on the ground that it was not published in 1816 and must date from Treitschke 1826. Hampson followed a rigid "first species rule" in the selection of genotypes regardless of any previous genotype selections. In this instance he cited Noctua cardui Esp. as the type of Heliothis Tr., changing the concept of the genus and removing armigera, virescens, and allied species to the genus Chloridea Westwood. Also on p. 657 of vol. 4 of his Catalogue, Hampson resurrected an older specific name, obsoleta Fabricius ("Bombyx obsoleta F.," Ent. Syst. vol. 3 (1), p. 456, 1793). In his generic change Hampson found few followers for, in the sense of the code, Heliothis must date from Ochsenheimer 1816, who had listed under his proposed name several species, among them Phalaena Noctua dipsacea L. which was selected as genotype by D. Thon before Hampson's selection of cardui. In his choice of a specific name (obsoleta F.) for the corn ear worm Hampson has been followed by most lepidopterists since 1903, and our latest American list (McDunnough, "Check list of the Lepidoptera of Canada and the United States" part 1, 1938) gives the combination as Heliothis obsoleta F. However, in 1935 ("Insects of Samoa", part 3, fasc. 4, Lepidoptera: Heterocera, p. 196) Tams showed that the Fabrician name could not be used, since Bombyx obsoleta F. 1793 was a primary homonym of Bombyx obsoleta F. 1775 (Syst. Ent., p. 579, No. 77), a quite different insect, now listed in the Lymantriidae. The correct combination for the corn ear worm is Heliothis armigera (Hbn.).

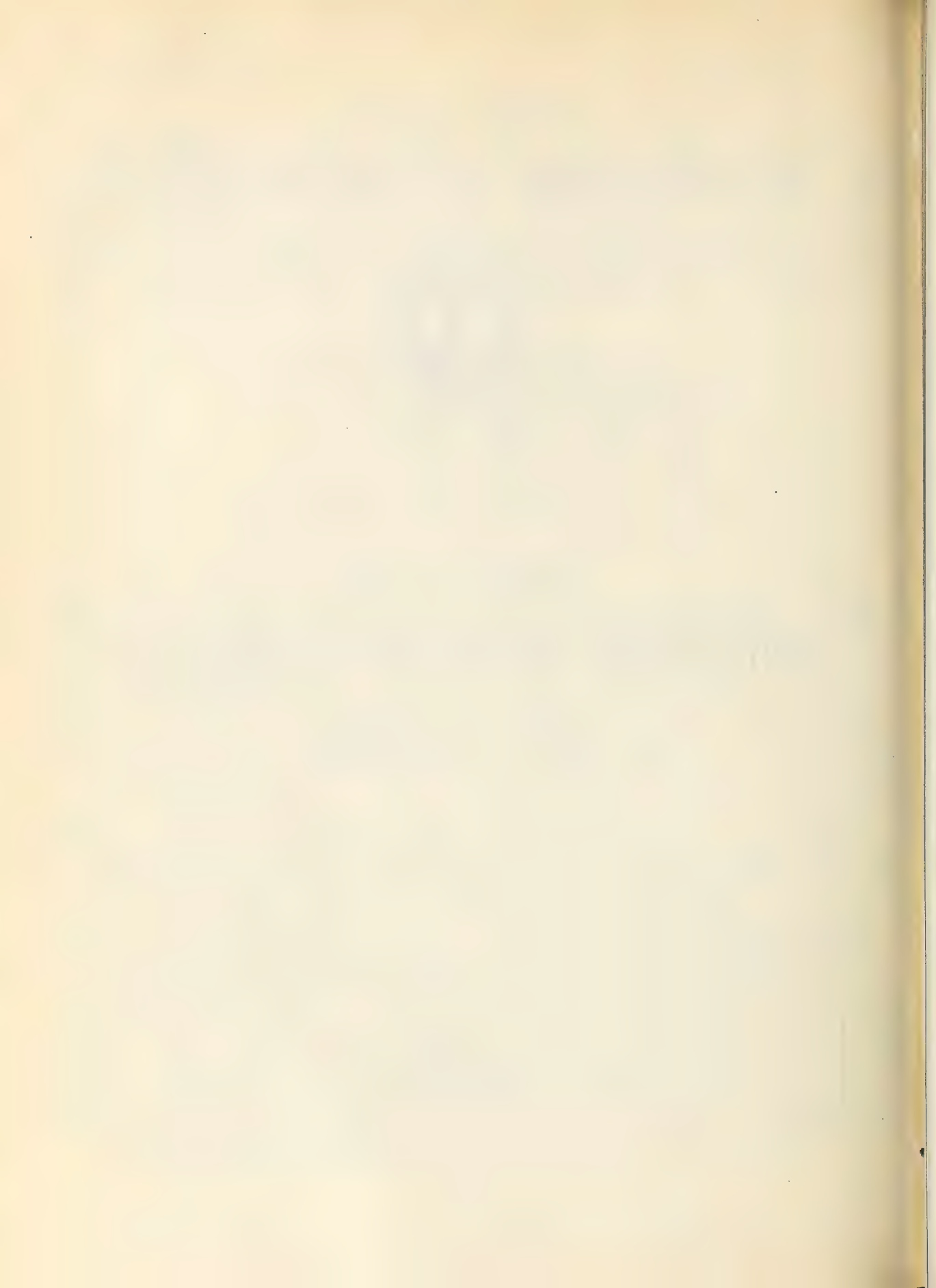
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UNITED STATES
DEPARTMENT OF AGRICULTURE



BUREAU OF
ENTOMOLOGY AND PLANT QUARANTINE
NEWS LETTER

VOLUME VI



UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE
NEWS LETTER
FOR APRIL 1939

Vol. VI, No. 6

(Not for publication)

June 1, 1939

ADMINISTRATION

W. W. Wood

Warren Wilbur Wood, of the Division of Foreign Plant Quarantines, died in a sanatorium at Valmore, N. Mex., on April 21, 1939, following an illness of approximately 5 months. Interment took place at Lawton, Mich., on April 25. Mr. Wood is survived by his wife, Irma Moore Wood, a 16-year-old daughter, and a 2-year-old son. Mr. Wood was born in Michigan on July 16, 1896. He received his B. S. degree from the Michigan Agricultural College in 1918. He was appointed as a junior plant quarantine inspector with the Federal Horticultural Board on May 18, 1925, and was stationed at the port of New York. Later he was transferred from New York and placed in charge of the foreign plant-quarantine enforcement at Detroit and Port Huron, Mich. Subsequently his district was extended to include all ports on the Canadian border from the Atlantic coast to the eastern border of Montana. On June 23, 1938, by transfer he succeeded A. G. Webb in charge of the supervision of the enforcement of foreign plant quarantines for the district including the States of Washington, Oregon, Idaho, and Montana, with headquarters at Seattle. Mr. Wood leaves a record of efficiency and the Bureau sustains the loss of one of its most proficient and outstanding men in the field of foreign plant quarantines.

A newly discovered introduced pest.--On April 11 L. P. Wehrle, of the University of Arizona Experiment Station, found specimens of an insect which closely resembles the alfalfa weevil feeding on fenugreek (Trigonella Foenum graecum) near Yuma, Ariz. The insect has been determined as Hypera brunneipennis (Boh.). This is the first time it has been recorded as occurring in this country and little is known about the insect itself or its distribution. According to the few available published records, it has been reported as occurring in Egypt, Ethiopia, and India. As soon as it was identified, arrangements were made to have a preliminary investigation made by Bureau specialists, in cooperation with representatives of the University of Arizona and the Arizona State Department of Agriculture and Horticulture. So far as yet determined, the infestation extends southward in a narrow strip for about 8 miles from Yuma. Infestation has also been found across the river from Yuma in the vicinity of Winterhaven, Imperial County, Calif. Preliminary reports indicate that this insect feeds on sour clover (Melilotus indica), hubam clover (Melilotus alba), and fenugreek (Trigonella Foenum graecum),

as well as on alfalfa; that at this time the adults are newly emerged and are staying close to the ground; also that, since the alfalfa hay in that area has recently been cut, scouting on an intensive scale to determine the limits of distribution appears to be impracticable until the next brood has sufficiently developed so that the larval stages of the insect may be found more readily by sweeping. A representative of this Bureau is being detailed there to keep this infestation under observation and to collect as many data as possible that may have a bearing on future plans with reference to it, as well as with respect to plans for intensive scouting.

A 4-H Club Insect Manual

The Extension Service has just issued a 4-H Club Insect Manual as Miscellaneous Publication 318 of the Department. This paper was prepared by M. P. Jones, extension entomologist, of the Division of Cooperative Extension Work. A copy of this publication was sent to each of the field stations of this Bureau. Officials will probably receive requests for this publication. We wish to call attention to the fact that this is not a publication of our Bureau and is being distributed by the Extension Service. Requests for this publication may be referred to the State Director of Extension in the State from which the request comes.

Suggestions on Preparation of Manuscripts

The Editorial Office has frequently been asked by authors for some written suggestions to guide them in the preparation of manuscripts. To be most useful such a guide should answer definite questions asked by authors or discuss matters that the editors have found to be most troublesome. Instead of waiting until such a pamphlet can be compiled, which even then would be incomplete, the Editorial Office will publish in the News Letter from time to time short memoranda covering single points or subjects which in the course of editing have been found to need explanation and concerning which information is not to be found in the Government Printing Office Style Manual. Attention to such points by authors should expedite the work in the Editorial Office and result in improved papers which are more truly the authors' own in manner of expression as well as in subject matter. For ease of reference, these editorial memoranda will be given numbers. The Editorial Office will be glad to answer any questions about manuscript preparation, either directly, or, if the question is of general interest, through these memoranda.

EDITORIAL OFFICE

Memorandum No. 1. The Summary

There appears to be some uncertainty as to what belongs in a summary. Some authors summarize only the results of their work, and others place their conclusions under this heading. Some summaries are too brief and general to give a definite idea of the contents of the paper, whereas others are too long either because of unimportant details or from lack of conciseness.

A summary is properly a summing up, or recapitulation, of the preceding discourse. It should be a concise statement of the important points in the entire paper, including the procedure or method employed and the type of data used, as well as the results and conclusion. It should give sufficient detail to inform the reader as to what new information is presented, so that he may decide whether the paper is of sufficient interest for him to read in full. The summary is all that those interested in the paper in only a general way will read, for the research worker must limit his study more or less to his own field. A good summary is also of service to abstractors.

The conclusion has an entirely different function from that of the summary. It constitutes the author's interpretation of his results, and is properly a part of the body of the paper, which should be summed up with the other parts in the summary. Sometimes the nature of the investigation is such that a discussion of results is more suitable than a statement of conclusions.

The summary should contain no material that is not presented in the text, and all statements should be in definite agreement with those in the text.

The length of a summary should be in proportion to the length of the article. For most papers about 3 percent is a proper proportion.

FRUIT INSECT INVESTIGATIONS

Methods for emulsification of dichloroethyl ether.--Two methods for the emulsification of dichloroethyl ether, in connection with studies for the control of the plum curculio attacking peaches, are reported by Oliver I. Snapp, of the Fort Valley, Ga., laboratory. One method consists of stirring nine parts by volume of dichloroethyl ether into one part by volume of potash fish-oil soap, containing approximately 30 percent of soap without an excess of potash, and then adding eight parts by volume of water for a 50-percent emulsion of dichloroethyl ether. The other method consists of adding eight volumes of water to one volume of the same grade of potash fish-oil soap, after which nine volumes of dichloroethyl ether are added and the constituents emulsified cold by pumping.

Winter survival and early spring activity of Japanese beetle.--The following summary of the winter survival and early spring activity of the Japanese beetle has been prepared by the staff of the Japanese beetle laboratory at Moorestown, N. J. The unusually late development observed among Japanese beetle larvae early in the fall of 1938 was largely overcome by the subsequent mild fall weather, although it appears that a somewhat higher than normal proportion of second-instar larvae entered hibernation. This condition persisted throughout the winter months when soil temperatures were below the threshold of development. During the winter months snow cover was generally sufficient throughout periods of severe weather to provide effective insulation, so that at the levels occupied by overwintering larvae soil temperatures (based on records made at Moorestown) presumably never fell more than 1° below freezing. Insofar, then, as can be determined, winter mortality was no higher than would be normally expected. At the close of April second-instar larvae, in general, constituted a higher proportion of the soil population than is normal for this

time of the year. Considerable variation existed, however, in the proportion of second-instar larvae in different sections of the area generally infested, ranging from 6 percent near Reading, Pa., to 33 percent in Westchester County, N. Y. In the immediate Philadelphia area roughly 15 percent of the current brood were second instars at the beginning of the month. Taking as the normal the average for the 11-year period 1926-36, inclusive, approximately 6+ percent of the soil population would be in the second larval instar.

MEXICAN FRUITFLY CONTROL

Fruitfly data from lower Rio Grande Valley.--Sterilization was required on all grapefruit harvested for shipment from the lower Rio Grande Valley after April 11. This action was necessary because of the steady increase in the degree of infestation, as well as the number of infestations being found in valley groves. In view of the fact that fruit sterilization proved such a success, it was possible to extend the harvesting season for grapefruit from April 30 to May 15. The harvesting season for Valencia oranges previously had been extended to June 15. Larval infestations were found on 704 properties within the regulated area and on 2 citrus plantings outside of the area. These last 2 infestations were found in Dimmit and LaSalle Counties. Trap records indicate that emergence of flies from infested groves began at a rapid rate during the latter half of April. In February 2,150 flies were trapped in valley groves, whereas in March only 588 flies were taken. The catch for April, however, increased to 1,931 flies and most of these were newly emerged. Fruit shipments for April totaled 2,656.6 equivalent carloads, bringing the total movement for the season to 28,266.7. This exceeds the movement for last season for the same period by 8,279.8 carloads.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Laboratory infection of wireworms by Metarrhizium.--L. P. Rockwood, Forest Grove, Oreg., reports that infection experiments, under laboratory conditions, using cultures of 2 forms of entomogenous fungi of the genus Metarrhizium on larvae of the elaterid Limoni californicus (Mann.), furnished by F. H. Shirck, of the Division of Truck Crop and Garden Insect Investigations, were carried on with the wireworms isolated in 3-ounce salve boxes and also with aggregations of 25-30 wireworms placed in 1-pound coffee cans. Sterilized sandy loam was used in the cans, with wheat kernels as food for the worms. The fungi used were a green-spored form, probably typical Metarrhizium anisopliae (Metsch.), that was cultured from an L. californicus larva from Parma, Idaho, in 1937, and a brown-spored form cultured from wireworms collected near Forest Grove in 1933. Approximately 50-percent mortality from fungous disease was obtained with either form in pure culture. Maximum mortality from fungous disease occurred about 5 weeks after infection was attempted. Coating the wireworms with spores of the fungus before placing them in the salve boxes gave no better results than inoculation of the soil in the 1-pound coffee cans. The indications were that wireworms may be susceptible to infection only at the time of molting. When mixed cultures of the green-spored Metarrhizium and brown-spored Metarrhizium were used as the infective agent there was a significant increase in the mortality from fungous disease. There were also indications that union between these forms of Metarrhizium may have occurred within the bodies of the living wireworms.

Preservation of food samples by quick freezing for use in European corn borer nutrition studies.--G. T. Bottger, Toledo, Ohio, reports that quick freezing of green plant tissue with CO₂ (dry ice) provides a convenient and entirely satisfactory means of preserving a composite sample of corn tissue for supplying homogeneous food for test larvae during the entire course of their development, thus enabling one chemical analysis to represent all of the food utilized in each experiment. Although freezing would not be likely to cause modification in the constituents in the corn tissue sufficient to affect the interpretation of biological results on a comparative basis, it was established that the total sugar and nitrogen content of green corn tissue is not appreciably affected by freezing, a fact which should greatly broaden the general utility of this method.

Synthetic food for nutrition studies with European corn borer larvae.--G. T. Bottger, Toledo, reports average survivals and weights of surviving larvae after feeding exclusively on synthetic food for 10, 20, and 30 days after hatching, as follows: For survivals of 19.0, 7.0, and 2.5 percent, respectively, the average weights per larva were 2.7, 14.6, and 32.6 milligrams, respectively. One of the test larvae confined to synthetic food continued to feed and grow after attaining an age of 30 days and reached a maximum weight of 89.0 milligrams when 38 days old. The growth rate is slower than that of larvae nourished on green plant media adapted to the borer's requirements, but the maximum weight attained is considered normal and the larva apparently has entered the diapause which normally precedes pupation in single-generation borers. The synthetic medium was formulated to simulate the chemical constituents of green sweet corn kernels. Commercial cellulose cotton provided the fiber, which serves as a carrier for the moisture, carbohydrates, protein, and mineral matter.

Sweet corn resistance to European corn borer.--Reporting on tests conducted in 1938, M. Schlosberg, Toledo, says: "During 1938, 427 inbred strains of sweet corn were entered in the field tests to study sweet corn resistance to the European corn borer. The entries were divided among types as follows: Bantam, 335; Country Gentleman, 50; Evergreen, 42. The performance of the strains was evaluated with the aid of the multiple regression analysis to adjust for varying experimental conditions, such as differences in maturity, height, and natural infestation, all strains within type being uniformly infested with eggs at a rate of 3 egg masses per plant to provide a measurement of larval survival on the respective entries. Of the Bantam strains, 9 showed significant negative departures in larval survival and 68 others indicated a trend toward resistance warranting further observation. Similarly, 1 Country Gentleman strain showed a significant negative departure and 11 indicated a trend toward resistance; and 2 Evergreen strains showed a significant departure and 2 indicated a trend toward resistance. Among the Bantams, Mich. 1828 was outstanding in its resistance performance, as it was in the more extensive tests conducted in comparison with the performance of Conn. 2, to determine its resistance over a wide range in its development at time of infestation."

Estimates of damage by European corn borer in 1938 and comparison with 1937 estimates.--A. M. Vance, Toledo, reports that in the Lake States area in 1938 the loss caused by the corn borer to corn harvested for grain was estimated at \$594,495 (83.3 percent of the entire loss in that area)

and to sweet corn at \$119,140 (16.7 percent), or a total of \$713,635. In the Eastern States area in 1938 the loss caused by the corn borer to corn harvested for grain was estimated at \$220,376 (25.2 percent of the entire loss in that area) and to sweet corn, at \$652,822 (74.8 percent), or a total of \$873,198. The average calculated loss of crop by the corn borer in 1938 for the entire area considered, based on the application of damage indices to populations of the insect, was 7 percent in corn harvested for grain and 13.3 percent in sweet corn. The average per acre loss in 1938 for grain corn was estimated at \$0.60 and for sweet corn at \$23.20. In comparison, the average per acre loss in 1937 for grain corn was estimated at \$0.33 and for sweet corn, at \$22.46. On the basis of all available information, the total damage caused by the European corn borer in 1938 over the greater part of the infested territory is placed conservatively between 2 and 2½ million dollars.

Genetic studies of European corn borer in 1938.--K. D. Arbuthnot, New Haven, Conn., reports that all crosses of Toledo and New Haven stock material have now been obtained in the laboratory. Crosses inter se with New Haven material are obtained most readily, followed in order by Toledo material, Toledo females and New Haven males, and New Haven females and Toledo males. As egg production from related pairs of moths is variable within a wide range, its significance as a measure of biological differences between strains must be studied carefully before interpretations can be made as to its utility. Measurable differences in the time of incubation of eggs may serve as one means of differentiating between inherently different strains. The New Haven field material has shown every evidence of being homozygous for nondiapause (multiple-generation character). The Toledo field material appears to be a mixed race in which the percentages of diapausing and nondiapausing larvae vary greatly between the progeny of different pairs of moths. Evidence that there are homozygous diapausing individuals was found in the progeny of one pair. Nondiapause has been shown to be dominant to diapause but their relation in inheritance was not discovered. The isolation of a homozygous single-generation (diapausing) strain has been greatly hindered by a lack of information on how to handle diapausing larvae to obtain pupae and moths for successive generations. Some progress has been made in this phase of the investigation.

JAPANESE BEETLE CONTROL

Methyl bromide fumigation praised by nurseryman.--The following quotation from an article appearing in the May 1939 issue of Horticultural Topics, a publication of the N. J. Association of Nurserymen, illustrates one nurseryman's experience with methyl bromide fumigation: "Construction of a gas box at a cost of slightly more than \$100 by the Koster Company at Bridgeton, has made possible the application of methyl bromide treatment to \$3,000 or \$4,000 worth of nursery stock which could not otherwise have been sold, according to C. Courtney Seabrook. He gives the following details about his firm's utilization of the new method of fumigating stock for shipment outside the Japanese beetle quarantine area. 'We started to build our gas box on a Monday morning and had it ready for our first treatment by Friday afternoon. We built our box on 2 4" x 6" skids so that it can be moved easily and also can be loaned to one of our neighbors. The box has 100-cubic-foot capacity and cost * * \$102.22. In addition to the

above costs of the box, we bought a 50-pound cylinder of methyl bromide which cost us \$45.91 delivered. Our box can treat 20 flats containing 1,000 6"-8" lining out Azalea mollis or 150 6"-8" Hinodegiri or 25 18" rhododendrons in 1 treatment. Additional labor, electricity, gas, and other items are about \$3.00, as compared with \$14.50 for the same number of plants by the old paradichlorobenzene method. We place the plants in our box the night before and leave it on all night so that the soil will have the correct temperature for treating the next morning. So far this spring we have probably treated \$3,000 or \$4,000 worth of material which we could not otherwise have sold, as the cost of treating the same material with paradichlorobenzene would have been prohibitive."

Inspections on the Eastern Shore of Maryland.--In the Salisbury, Md., district inspections of nursery stock reached their maximum in April. One nurseryman in the Salisbury area has installed a washing machine to facilitate cleaning and certification of their plants from infested fields. The washer used was originally utilized in cleaning sweetpotatoes, but with the installation of pressure nozzles over the endless belt, it was readily adapted to the cleaning of strawberry plants. The plants are placed on the endless belt. As they pass through the washer they are drenched with fine streams of water from all angles. The plants then move out of the bath onto a long table where they are inspected and placed in baskets for tying.

North Carolina soil treatments about completed.--During the month, applications of lead arsenate were made to over 200 acres at and surrounding known Japanese beetle infestations in North Carolina. The cooperative State-Federal treatments started in Winston-Salem and Greensboro on March 27 were completed on April 12 and 19, respectively, with 69.7 acres sprayed in Greensboro and 52.4 acres treated in Winston-Salem. Additional treatments in North Carolina were made as follows: Charlotte, 6.1 acres, April 18-26; East Spencer, 12.9 acres, April 22-30; Elizabeth City, 3.9 acres, April 25-29; Raleigh, 3 acres, April 29-30; Sanford, 10 acres, April 13-24; Spencer, 34.1 acres, April 13-28; and Wilmington, 19.9 acres, April 5-29. Treating work in Raleigh continued into May. In addition to the soil treatments in North Carolina, Bureau-owned spray trucks and supervisors from this Division assisted in the application of State-purchased lead arsenate to 4 acres in Conneaut, Ohio. Further treatments in Ohio continued into May.

Road stations begin operations.--During April 17 highway vehicular stations were established. On the first of the month, 5 posts in Virginia and 2 in West Virginia were opened. In Ohio 9 stations were established, 5 on April 17, 2 on April 18, and 1 each on April 20 and 22. A single station was established in Pennsylvania on April 22. The first interception of Japanese beetle larvae in plant material inspected at the road posts was made on April 8. This consisted of 3 larvae in soil accompanying perennials purchased at Baltimore, Md., for movement to Stanley, Va. During the month 12 infested shipments were intercepted, from which were removed 23 larvae, 1 pupa, and 1 adult.

Methyl bromide demonstration.--A demonstration of the new methyl bromide fumigation procedure was given on April 20 at the New York School of Agriculture at Farmingdale, Long Island. Arrangements for the demonstration were made in cooperation with A. B. Buchholz, of the New York Department

of Agriculture. Numerous plant growers and other interested parties attended. Tests with this fumigant have continued with favorable results in New Jersey. Several of the larger nurseries are carrying on independent trials with many different plant species to determine whether the various kinds of plants may be safely fumigated with this material.

Interdivisional Japanese beetle trapping.--During April, 1,344 Japanese beetle scouting traps were distributed in lots of a dozen each to field stations of the Bureau in 27 nonquarantined States and 6 partially regulated States. Those traps will be set up and tended by the personnel at the various field stations. All beetles trapped will be forwarded to the Bloomfield, N. J., field headquarters for identification.

Exhibit material heat treated.--An eagle's nest, several old and rotted stumps, 15 bags of leaves, and several swallows' nests were submitted to the district inspector at Portland, Maine, for inspection and certification prior to shipment to the New York World's Fair for use in the State of Maine exhibit. Since it was impracticable to inspect these articles for gypsy moth egg clusters the State arranged for the use of a lumber kiln near Auburn, where the articles were heat treated under the supervision of the district inspector. The first lot of nursery stock offered for inspection this spring in the Portland district was examined on April 24. There was considerable frost in the ground in some sections of this district at the end of the month.

Cold weather delays nursery inspection season and gypsy moth hatching.--Continued cold weather has delayed nursery inspection throughout New England from 2 to 3 weeks. None of the district inspectors have observed hatching of gypsy moth egg clusters, whereas in 1938 hatching of egg masses was reported on April 27 in Connecticut, New Hampshire, and Rhode Island, and on April 28 in Vermont. Indications at the end of the month were that the egg clusters would not hatch for at least 10 days or 2 weeks. As soon as hatching starts, all nursery stock presented for inspection and certification must be sprayed, owing to the hazard of its becoming infested with wind-blown larvae.

Additions to inspection corps.--During the month 13 temporary gypsy moth inspectors were added to the New England personnel--1 in Rhode Island, 3 in Connecticut, 2 in Massachusetts, and 7 in Maine. At a forest nursery in western Maine, the ground did not thaw sufficiently to permit digging of nursery stock until April 26. The district inspector in the area and 7 temporary inspectors were immediately assigned to this establishment, since all its shipments must be inspected and certified within the brief period during which the stock is sufficiently dormant for replanting.

City-owned lumber inspected.--During the hurricane of September 21, 1938, the city of Concord, N. H., lost over 1,000,000 board feet of standing timber in the public parks and on water-department land. This was sawed during the early winter and stored in open lots. Over 600,000 feet of this was sold in April to a shipbuilding corporation in Camden, N. J. Seventy-five thousand feet of this lumber has already been inspected and certified for shipment.

Confirmations outside previously known infected area.--Confirmation on April 11 of samples taken from a devitalized elm located in Upper Freehold Township, Monmouth County, N. J., added 198 square miles to the infected zone and increased the work area by 114 square miles. The total number of square miles in the New Jersey Dutch elm disease work area is now 4,112, with 3,610 square miles in the infected zone and 502 square miles in the surrounding protective zone. This first-record confirmation added the townships of Bordentown, Chesterfield, New Hanover, and North Hanover, the boroughs of Bordentown and Chesterfield, and the city of Bordentown, all in Burlington County, and Plumstead Township in Ocean County to the work area. Another first-record confirmation was received during the month from Tinicum Township, Bucks County, Pa. This location is 1.1 miles north of Point Pleasant, along the Delaware River.

Increasing W. P. A. force.--In an attempt to bring the W. P. A. workers engaged in Dutch elm disease eradication up to the number allotted for the months of May and June, referrals were interviewed late in April and some were accepted in the different work areas. Schools for training men to scout for beetle-infested trees were started at the end of April. Those who cannot qualify for this type of work will be transferred to elm-sanitation crews.

Dutch elm disease personnel.--Employees of the Dutch elm disease eradication projects at the end of April numbered 66 regular appointees, 129 W. P. A. appointees, 6 men on the regular per diem payroll, 3,434 W. P. A. workers, 15 State-appointed officials, and 48 State per diem workers, a grand total of 3,698 men.

Reconnaissance survey completed.--A reconnaissance survey by auto-giro ground crews was completed on April 19. The entire project involved coverage of 540 linear miles of strips, a total area of 8,640 acres, or 13.5 square miles, in the States of Connecticut, New York, and Pennsylvania.

FOREST INSECT INVESTIGATIONS

Low winter mortality of eastern hemlock borer in Wisconsin.--In order to obtain data on winter mortality of the hemlock borer, observations were made at the Menominee Indian Reservation in December, February, and April. As a result of these observations, H. C. Secrest, Milwaukee, reports that this mortality is of little importance, being about 3 percent for the large larvae and 10 percent for the small. Larval activity was evident on April 27, and some of the largest larvae, those in cells in the bark, appeared to be entering the prepupal stage. An appreciable number of early instar larvae were found between the bark and the wood.

Tests with sprays for broods of elm bark beetle.--R. R. Whitten, Morristown, N. J., has submitted a progress report on experiments he is conducting with lethal oil sprays for the control of the two elm bark beetles, Scolytus multistriatus Marsh. and Hylurgopinus rufipes Eich. Although these experiments have been limited, they indicate that such sprays have promising possibilities when applied to elm logs infested with the larvae of the bark beetles. The bark of logs in which the larvae were in various stages of development was sprayed with different mixtures at

different times of year. Mr. Whitten has found that (1) mature larvae are more susceptible to the sprays than younger larvae, (2) sprays applied under winter conditions are not as effective as when they are applied in May or June, (3) orthodichlorobenzene applied at the rate of 1 part to 4 parts of a penetrating oil carrier was the most effective agent tested, and (4) a penetrating oil was the most effective carrier used, although water with an emulsifier showed promise.

High parasitization of elm bark beetle.---W. C. Baker, Morristown, has noted an instance where the smaller European elm bark beetle (*S. multistriatus*) was heavily parasitized by a hymenopteron, *Cheirophys colon* Westw. From an elm branch collected on March 17 at Beekman, N. Y., 140 adults of the parasite and 24 adults of the beetle emerged. Unfortunately the branch had been attacked by woodpeckers before it was collected and a more accurate determination of the percentage of parasitization could not be made.

Mountain pine beetle control in white pine stands of northern Idaho.---Artificial control measures for the reduction of localized outbreaks of *Dendroctonus monticolae* Hopk. in valuable white pine stands of the Kootenai and Clearwater National Forests were instituted in April. These two projects call for an expenditure of approximately \$35,000, with the employment of more than 200 men during a 6-week period. The Clearwater project is the larger operation, requiring an expenditure of \$25,000, which will be borne in part by the Clearwater Timber Protective Association in payment for the treatment of trees on lands under their protection. These projects are under the direct administration of the Forest Service, with forest-insect laboratory of the Bureau of Entomology and Plant Quarantine acting as technical adviser. W. D. Bedard spent the period from April 17 to 26 on the Kootenai National Forest, assisting in the training of personnel and in designating boundaries of the areas to be treated. T. T. Terrell will spend all of May and part of June on the Clearwater National Forest assisting in the training, supervision, and direction of spotting crews, the checking of treating, and the designation of area boundaries.

Salmon River infestation.---During the latter part of April, T. T. Terrell, Coeur d'Alene, Idaho, spent several days in making a rather thorough examination of an infestation of the western pine beetle in an area of ponderosa pine near Riggins, Idaho. This area is located on the so-called dry breaks of the Salmon River, where the timber sites are somewhat marginal. Mr. Terrell found that, although the western pine beetle was primarily responsible for the severe losses that have occurred during the last 2 years, a buprestid beetle, *Melanophila* sp., had destroyed many of the smaller trees and was also attacking with the more primary pine beetle. A deficiency in precipitation during the past few years is believed to be responsible for leaving the trees weakened and therefore susceptible to outbreaks of these insects. At present the losses have so decreased that control measures are not considered necessary and it is believed that a return to normal precipitation will end this disturbance.

W. P. A. controls bark-beetle infestation on private lands.---Dwight A. Hester, Fort Collins, Colo., reports that an area of about 60 sections containing approximately 2,700 ponderosa pine trees infested with the

Black Hills beetle is now being treated by W. P. A. crews. This area is privately owned and lies northeast of Bailey, Colo., and adjoins the Pike National Forest on the south and west sides. To date about 500 trees have been treated by the peeling method and the work is progressing satisfactorily. The labor is being furnished by the W. P. A. office in Denver and the sponsors for the project include the State entomologist, the United States Forest Service, and the Denver Mountain Parks Improvement and Protective Association. The sponsors' funds are made up of donations from the State, the Forest Service, the City of Denver, the Denver Water Board, the Bell Telephone Company, and Public Service, and of private donations collected by the Denver Mountain Parks Association. These funds are being spent for equipment, rental and maintenance of camps, and for the hiring of trained men who act as foremen for the W. P. A. laborers. The project is being carried on under the technical supervision of the Fort Collins laboratory of the Bureau. Control measures have been undertaken on the north, west, and south sides of this project area during the last 2 years. As the infestation does not extend eastward from this area, it is hoped that this work will check an extensive infestation which has been evident for the last several years.

Types of Black Hills beetle galleries.--Anyone acquainted with the galleries made by the Black Hills beetle must have wondered why some galleries start out with a right crook and some with a left crook. Why such is the case is still not known, but studies at the field station of the Fort Collins laboratory in 1938 showed that there was a significantly greater number of galleries with right crooks than with left crooks. This was found to be true for the three common host trees in the Rocky Mountain region, Pinus ponderosa, P. contorta, and P. flexilis. As with other animals, abnormal habits occur at times with individual Black Hills beetles. The normal female beetle after once completing the initial crook, extends her gallery up the tree with the grain of the wood, even to the point of following the grain around knot swellings and the twisted grain in spiral-grained trees. A few abnormal females, however, seem to have lost their negative-geotropism and extend their galleries, sometimes right from the start, down the grain of the trees. Such habits as those mentioned above may seem to be without any economic significance whatever, but changes in the frequency of such habits may be found to indicate a change in status of an outbreak and consequently enable one to judge better the measures needed to combat the insect.

Black Hills beetle larger in ponderosa pine.--Donald De Leon, Fort Collins, reports that the Black Hills beetle in ponderosa pine is significantly larger in size than the same species from limber pine, and those from limber pine are larger than those from lodgepole pine. The greatest brood per square foot, however, is found in limber pine, with the next largest brood being found in ponderosa pine. It is to be expected that larger broods would be found in the tree species with the thickest phloem, but no explanation can be given unless it could be differences in the nutritional value of the phloem, for the differences in size of the beetles from these three trees.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Snowshoes wear out rapidly in mountains of Vermont.--The most severe snowstorm of the season in the Vermont, Massachusetts, and Connecticut gypsy moth areas occurred on April 3 and 4. The snowfall averaged from 10 to 12 inches in depth on the high elevations of northwestern Connecticut and in the Berkshire Mountains in Massachusetts, while 18 to 24 inches of snow fell in the Green Mountains of Vermont. The deep snow has caused considerable damage to snowshoes used by gypsy moth scouts, particularly on the high elevations of Vermont where snowshoes have been in constant use since last December. A crust forms during the night which cuts the webbing of the snowshoes. As the temperature rises during the day, the crust gradually disappears, the snow becomes soft and wet, and the rawhide webbing softens and stretches. The wet snow slowly works through the webbing and gathers on the surface of the snowshoes, weighting them down so that the wearers soon tire. It is estimated that approximately 125 pairs of snowshoes have been worn out this season in the Vermont area alone. Although the snow practically disappeared from the fields and southern slopes of hills in Vermont during the last 2 weeks in April, several feet of snow remained on the upper slopes, especially on densely wooded northern exposures.

Restrictions on brush burning increased.--During the last few weeks the burning permits have been restricted to periods of 10 days or less. Now, because of the forest-fire danger resulting from the recent hurricane, fire wardens in Vermont, Massachusetts, and Connecticut have been instructed to issue no permits for burning until the danger of fire has passed, except under special conditions and then for 1 day only.

Weather stations set up in three States.--Weather stations for recording meteorological data were set up in Westfield, Mass.; in Milan and Berlin, N. Y.; and in Clarendon, Vt., in the latter part of April. Arrangements have been made to have each station visited at least once every day during their operating period, which will end about June 1, for the purpose of checking up on the operation of the machines, making necessary minor repairs and changing charts. The records from these stations are used in determining possible dispersion of the small gypsy moth caterpillars by the wind.

Supervisory employees instructed in first aid.--Instructions in first aid were given to gypsy moth supervisory employees assigned to duty in Vermont, Massachusetts, Connecticut, and Pennsylvania in April. These men will, in turn, instruct the crew foremen working under their supervision as to approved methods of making splints and applying bandages.

Preparations for gypsy moth spraying in western Massachusetts.--Preparations for the erection of temporary barbwire fences, designed to prevent cattle from grazing in areas which will be sprayed with lead arsenate solution later in the season, were made in several localities in western Massachusetts in April. Brush was removed along one set of proposed fence lines and fence posts were cut. The posts will be placed in position as soon as the frost is out of the ground sufficiently to permit them to be driven. Rolls of barbwire were distributed along a proposed fence line about $1\frac{1}{2}$ miles from the nearest highway by three men who used a small shop-made trailer drawn by a tractor. If the same task had been performed by

hand it would have taken twice as many men 3 days, as the country is rugged and the fence extends across steep slopes about 1,300 feet in elevation.

Nurseries very active on Long Island.--The movement of nursery stock from the section of Nassau County, Long Island, N. Y., that is regulated on account of the gypsy moth continued to be very active during April. Besides filling their customary orders, the nurseries have made many large shipments to the New York World's Fair grounds. The heavy increase in business by the nurseries has made it necessary to increase the number of men assigned to inspecting the plants for the gypsy moth.

Gypsy moth infestation apparently exterminated.--Check-up work in the vicinity of the gypsy moth infestation located in the township of Damascus, Wayne County, Pa., during the fiscal year 1938 was recently completed with negative results, and the colony has apparently been exterminated. This infestation was situated at a point about 40 miles northeast of Pittston, which is considered the approximate center of the original infestation in that State, and was farther from the center of infestation than any other outlying colony in the Pennsylvania area.

Spraying preparations in progress in Pennsylvania.--During the latter part of April several agents were detailed to obtain spraying permits in residential areas in Pennsylvania in which gypsy moth spraying work will be started as early in May as foliage development will permit. In previous years the residential spraying was begun about May 18, but this year all signs indicate that the foliage may be considerably delayed. In residential sections of Wilkes-Barre and Plains Townships 866 permits for spraying were obtained during the last week in April, and many more must be obtained before spraying begins. It is estimated that 7 sprayers will be needed to treat the infestations found in residential sections in the Susquehanna and Lackawanna Valleys this year, and an equal number will be required to wash the spray mixture from the buildings and fences immediately after the spraying is done. Supplies of burlap, used for banding trees at infested locations, were distributed in the field during this period. The burlap bands will be used in areas where no spraying work is planned for this year. Arrangements have also been made for most of the fencing work necessary around areas to be sprayed, and some barbwire had been distributed by the end of April.

Clean-up of railroad sidings an important gypsy moth control measure.--As approximately 50 percent of the anthracite coal production of Pennsylvania is mined in the section of the State included in the quarantined area, railroad sidings are numerous throughout the district. Many of these sidings are in business or industrial centers where no tree growth exists, but many others are so located that trees or brush normally line the sidings. Since the gypsy moth was found in the State this forest growth has been removed periodically and the sidings kept clean so that the dispersion of the gypsy moth through transportation in railroad cars may be prevented. The movements of railroad equipment likely to harbor the insect are also carefully checked. In order to facilitate this work, a regular employee of this project has recently been engaged in mapping all railroad sidings located within the quarantined area.

C. C. C. gypsy moth work in Connecticut.--The outstanding accomplishment in C. C. C. gypsy moth work during the last quarter is the large number of egg clusters creosoted or burned in the Granby-Simsbury-Canton area in Connecticut. An estimated total of 3,222,334 egg clusters were treated, approximately 1,361,400 of which were destroyed by burning in piles of debris. Up to April 1 of this fiscal year, 5,218,879 egg clusters were destroyed in this area. A large portion of this figure is an estimate count. Egg clusters are actually counted when they are scattered, but when large numbers occur together on tree trunks and on the under side of limbs the figures are obtained by estimate. It is believed that, with the experience the men have had, the estimate is as accurate as can be made in a very dense infestation. An idea of the degree of infestation in this section is obtained by considering that this great number of egg clusters were treated in an area of only 445 acres, and that the work is not yet completed in some of the sections. By cooperation between this Bureau, the C. C. C. organization, and the Connecticut State Forest Service, a large part of this area will be sprayed during the approaching gypsy moth larval season.

PLANT DISEASE CONTROL

Three million barberry bushes destroyed in West Virginia since January 1.--According to Tom Van Zanden, in charge of barberry eradication in West Virginia, 3,000,000 Berberis canadensis and approximately 1,000 B. vulgaris were destroyed in that State during the last 4 months. Of these, 60 percent were treated with salt brine and 40 percent were eradicated with dry salt, 137 tons of salt being used at the rate of 120 pounds per square rod of area infested with barberry bushes. During the summer months from 90 to 100 pounds per square rod are adequate to obtain a 100-percent kill.

Results of educational work in Ohio.--Harry Atwood, State leader in Ohio, reports that during 1938 54 barberry locations were reported by school teachers, children, former barberry-eradication supervisors, former security-wage earners, county agricultural agents, nursery inspectors, and farmers. These were distributed throughout 20 counties and represented more than 10 percent of all infested properties found during the year.

Results of intensive survey in four counties in Indiana.--Stanley Castell, in charge of barberry eradication in Indiana, reports that in 4 counties in that State, where an intensive survey has just been completed, 9,000 barberry bushes were destroyed on 75 properties. Each of these counties had received a preliminary survey prior to 1933. The following table shows a comparison of the number of bushes and properties found prior to 1933 with the number of new properties and bushes found in the survey just completed.

County	1918 - June/30/33				July 1/33 - 1939			
	Properties		Total bushes		Properties		Total bushes	
	City	Rural	City	Rural	City	Rural	City	Rural
Carrol-----	16	31	22	25,832	1	12	1	3,345
Fulton-----	7	13	9	491	2	6	24	5,176
Huntington----	45	10	129	31	7	5	27	28
Miami-----	15	13	21	144	8	34	11	450
Total-----	83	67	181	26,498	18	57	63	8,999

Four hundred thousand barberries destroyed in southwestern Colorado since January 1.--E. A. Lungren, in charge of barberry eradication in Colorado and Wyoming, reports that 82 security wage earners have made an intensive survey since January 1 of 216 square miles in Archuleta, La Plata, Montezuma, and Montrose Counties, Colo., with the result that 423,000 barberry bushes, Berberis fendleri, have been destroyed on 11 different properties. On April 15 a survey was begun in an extensive area of Berberis vulgaris in Montrose County.

Phenological data.--Ray H. Hirt, of the New York State College of Forestry, Syracuse, N. Y., reports: "While in Warrensburg, N. Y., on April 27 and 28 I examined many blister rust cankers on both reproduction and older trees but found no cankers developed, even to the point of having any small swellings where the season's aecia will appear. The season is very backward, forest soil is still frozen, with snow in the forest. Ribes bushes in the open are breaking their buds. In the vicinity of Syracuse aecia were just breaking through pine bark on April 22, 1939." F. A. Patty and J. N. Mitchell, of the Oakland, Calif., blister rust office, in recording Ribes phenology, observed several cases where leaves of Ribes roezli had remained undefoliated and green over winter on bushes that had been buried under from 5 to 6 feet of snow at an elevation of around 6,500 feet. This indicates the possibility of occasional overwintering of the rust on Ribes during a mild winter.

State-sponsored W. P. A. blister rust control projects.--In the Southern Appalachian Region two States, North Carolina and Virginia, have State-sponsored W. P. A. blister rust control projects. In North Carolina the project, which was sponsored by the division of entomology, State Department of Agriculture, provides funds for work in Avery, Mitchell, and Watauga Counties. Work on this project was begun the latter part of February. The State W. P. A. blister rust control project in Virginia was sponsored by the bureau of plant industry, of the Virginia Department of Agriculture and Immigration. Work was begun the latter part of January.

New England townships cooperate in blister rust control.--At recent town meetings in New England, 35 townships in New Hampshire and 45 townships in Maine appropriated a total of \$16,325 for cooperative blister rust control work. This represents a decrease of about 25 percent in the amount of town cooperation provided last year in New Hampshire and is probably due largely to the effects of the hurricane. In Maine 6 more townships cooperated this year than in 1938. Considering the extent of damage in New England from the hurricane, the cooperation of the townships in blister rust control work, as indicated above, is considered very good.

Checking nursery for Ribes after lapse of two years.--H. N. Putnam reports that a check for Ribes, which he and Mr. Bergeson made in April around an Illinois nursery, proved particularly interesting because it seemed to indicate the feasibility of checking nursery sanitation zones every 2 years after the initial work had been done rather than checking annually. The protective zone around this nursery had not been checked since 1937. It was an ideal time of year for the work, as the Ribes were in leaf well ahead of the associated vegetation. Control work around this nursery consists entirely of reworking several miles of Osage-orange hedges. Work was first carried on around the nursery in the spring of 1936, at which time 1,600 large Ribes missouriense bushes were found in the hedge rows. After this initial work was done the sanitation zone was checked and 131 bushes, mostly sprouts, and a few seedlings with a total of 197 feet of live stem were found and removed. In 1937 the sanitation zone was again checked and 39 bushes, mostly sprouts, were found. This spring, after a lapse of 2 years, a total of 614 bushes containing 700 feet of live stem were eradicated. Nearly all of these bushes were 2-year seedlings averaging about 1 foot of live stem each and thus plainly visible. It was interesting to note that these seedlings were found almost entirely at the same locations where large bushes had been found previously and on sites that had either been burned over or disturbed by the cutting back of the Osage-orange hedges. There are approximately 300,000 white pines of 2-0 stock and 40,000 of 2-1 stock in the nursery. Enough beds are being seeded to white pines this spring to produce 200,000 plants. Approximately 50,000 white pines had already been sold for distribution within the State this spring.

COTTON INSECT INVESTIGATIONS

Sweeping versus "shagging" to determine mirid population on cotton.--Different methods of determining the population of the mirids Adelphocoris rapidus (Say), Lygus pratensis oblineatus (Say), and Psallus seriatus (Reut.) on cotton have been tested. At Tallulah, La., in 1937 the infestation or population records made by counting all of these mirids collected per 100 sweeps with a net across the tops of the cotton plants through the center of each plot showed that about 3 times as many mirids were taken per 100 sweeps as were observed by examining 75 plants (25 plants in the center and at each end of the plots). In the sweepings more adults than nymphs were taken, and in the plant examinations more nymphs were observed than adults. This difference in the 2 methods was to be expected, as the adults readily take to flight when the cotton plant is disturbed, making the adults more likely to be taken in the sweeping net and less likely to be observed in examining the plants. Since a much larger number of mirids were collected by sweeping with a net, it was decided to discontinue the method of determining the infestation by counting the insects on the plants in 1938. However, since the sweeping method may not give a reliable index as to the nymphal population of the plots another method of making population counts or infestation records was tested. This is the "shagging" or "hoop and bag" method that has been used for collecting boll weevils from cotton plants. The upper part of the plants are shaken over a canvas bag fastened around a rigid iron hoop. The infestation record was made by making 100 "shags" per plot at the same time 100 sweeps were made with the net. A total of 1,100 sweeps and 1,100 "shags" were made. The results of these tests are summarized by

G. L. Smith and A. L. Scales as follows: "The ratio of the number of mirids collected was approximately 60 to 40 in favor of the shagging method when shags were made with a boll weevil collecting hoop and bag, as compared with sweeps made with an ordinary insect collecting net. Also the ratio of adults to nymphs taken by shagging was about 60 to 40, whereas with the sweeping net it was about 75 to 25. These results indicate that the shagging method gives a slightly better index to the nymphal mirid population than does the sweeping method. Shagging is done more quickly than sweeping. Incidentally, in shagging this cotton 2,604 boll weevils were taken, as compared to 554 taken by the same number of sweepings with a net. In 1938 the only mirids counted were A. rapidus and L. pratensis, as these are the members of the family ordinarily injurious to cotton in the vicinity of Tallulah. The true cotton flea hopper, P. seriatus, is usually present but is seldom a serious pest in that locality. Of the 1,308 mirids collected in the plots during 1938 there were 836 (535 adults and 301 nymphs) of A. rapidus and 472 (321 adults and 151 nymphs) of L. pratensis."

Field-plot control tests for mirids and boll weevil.--G. L. Smith and A. L. Scales, of the Tallulah laboratory, report the average yields in two sets of field-plot tests in Madison Parish, La., in 1938, as follows:

Treatment	Average yield per	Average increase per	
	acre of seed cotton:	acre of seed cotton	
	Pounds	Pounds	Percent
Check-----	1,354.5	--	--
Sulfur-----	1,459.5	105.0	7.2
Derris-sulfur 1:7----	1,525.5	171.0	11.2
Ca. ars.-sulfur 1:1--	1,842.5	488.0	26.5
Calcium arsenate-----	1,793.0	438.5	24.5

The fields in which these tests were made were selected because the rapid plant bug (A. rapidus) and the tarnished plant bug (L. pratensis) were fairly abundant about July 15. However, during the wet season that followed for about 30 days, these mirids did not increase very much, while the boll weevils did increase, and the gains in yield from dusting with calcium arsenate and the mixture of calcium arsenate and sulfur were due chiefly to boll weevil control. Each field was divided into five equal plots for the experiment. In the field with an average boll weevil infestation of about 36 percent when the first dusts were applied on July 13 and, with an average infestation in all plots from July 13 to August 10 of about 46 percent, there was an increase in yield of seed cotton from dusting with calcium arsenate of 38.9 percent (602 pounds per acre) and from dusting with the calcium arsenate-sulfur mixture of 34.7 percent (517 pounds per acre); while in the field with a lower average boll weevil infestation of about 31 percent when the first dusts were applied on July 13 and, with an average infestation in all plots from July 13 to August 9 of about 41 percent, the increased yield in the plot dusted with calcium arsenate was only 13.7 percent (275 pounds per acre) and in the calcium arsenate-sulfur dusted plot only 20.9 percent (456 pounds per acre). The increased yields in the plots dusted with sulfur and the mixture of 1 part of derris and 7 parts of sulfur ranged from 5.1 percent to 12.6 percent, owing largely to mirid control. Under average boll weevil and mirid conditions in Madison Parish, the dual-purpose calcium arsenate-sulfur mixtures may be more profitable than calcium arsenate, while with severe

weevil infestations and light mirid infestations calcium arsenate will probably be more profitable for cotton dusting.

Hemipterous insects in Arizona greatly reduced by low winter temperatures.--The winter of 1938-39 was much colder in Arizona than the preceding winter, 1937-38. The effect of the low winter temperatures during the past winter upon the hemipterous insect population was indicated by comparing insect collections made during the last week of April in each year. On April 24, 1939, T. C. Barber, Mesa, Ariz., was able to collect only 17 hemipterous insects with 800 strokes of an insect-collecting net on alfalfa, sugar beets, grains, and weeds; whereas on April 27, 1938, with 900 strokes under similar conditions, he collected 429 hemipterous insects. Following a cold winter (1938-39) an average of 2.1 insects were collected by each 100 strokes of the net; whereas following a mild winter (1937-38) there were collected 47.7 insects per 100 strokes. The hemipterous insects were apparently more than 22 times as abundant in the spring of 1938 as they were in the spring of 1939. The insects forming the greater part of these collections were Lygus spp., Geocoris spp., Nabis ferus L., and Croceontiades fernalis Van D.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Control program in Arizona to eradicate the pink bollworm.--On account of the finding of reinfestation of the pink bollworm in the Salt River Valley, after a lapse of several years, a control program was inaugurated in that area after it had been placed under regulation, which called for the destruction of all cotton stalks and clean-up of infested fields and those adjacent thereto. Following the program carried on through the winter and early spring of 1938-39, activities referred to as the "spring program" were begun on April 10, consisting of a continuation of the work previously carried on and with the additional control measure of the elimination of all stub or volunteer cotton in a still greater area, in order to create a starvation period for any possible emerging pink bollworm moths prior to the fruiting of the 1939 cotton crop. The delayed planting, on a cooperative basis, of both short-staple and long-staple varieties of cotton, was also one of the important measures recommended for this area. This control work has been carried on successfully. Cooperation on the part of farmers has been excellent; suggested planting dates have as a rule been adhered to; and it is believed that farmers in every instance, wherever possible, will hold off water from their plantings to prevent squaring and blooming until June 15, another measure recommended in the plan for pink bollworm eradication in this area. Grubbing crews were placed in the fields on April 17 to take out scattered volunteer cotton that had been missed by sledding and plowing or which it was impossible to remove in that manner because of being on ditch banks or other inaccessible places. During April, 7,800 acres were sledded and cleaned and 4,090 acres had been covered by the grubbing crews. The Agricultural Adjustment Administration issued a regulation on April 29 requiring the destruction of all stub cotton by May 10 in the area east of a line south through Tempe and south of the Salt River in Maricopa County, in all of Pima County, and in all of Pinal County. This regulation was issued on recommendation of the Bureau and the State entomologist of Arizona. It was issued under authority of Paragraph (1) (a) of Section 16 (a) of the Arizona Handbook for 1939, following the determination of the A. A. A. that failure to destroy the stub cotton will

constitute a practice which defeats the purposes of the 1939 Agricultural Conservation Program. The penalty for failure to observe the regulation will be a deduction of 4 cents per pound of the normal yield per acre for the farm for each acre of volunteer short-staple or American-Egyptian cotton not destroyed by May 10.

The Big Bend area.--The heavy increase in pink bollworm infestation in the Big Bend of Texas and adjacent Ojinaga district of Mexico, in the 1937 crop, made it imperative to inaugurate a special control program, referred to as the "2-year plan," for those districts, in cooperation with officials of the Mexican Department of Agriculture. We are now in the second year of this program, which called for early planting of cotton in the spring of 1938, followed immediately by clean-up of fields, and a delayed planting date of April 20 for the 1939 cotton crop, with the expectation that most of the worms hibernating in the ground will emerge as moths and die before the cotton fruits. The important phase of this program, calling for delayed planting on both sides of the Rio Grande, was observed and the cooperation of all farmers in the area is very gratifying. The next step in this plan will be the elimination of all soca or sprout cotton plants from the 1938 crop, which might furnish fruit upon which the pink bollworm could maintain itself and produce numbers to damage the main crop. Destruction of sprout plants is expected to get under way about May 1.

Inspection.--In the lower Rio Grande Valley of Texas a control program for the eradication of the pink bollworm has been carried on since the discovery of that pest in 1936 in that area and in adjacent areas of Mexico across the Rio Grande. Similar control measures have been carried on by the Mexican Department of Agriculture in the affected areas of that region, in cooperation with this Division. In that mild climate cotton plants are seldom killed by frost, but remain alive all winter, thus normally providing a host for the pink bollworm throughout the year. Control measures for this area provide for the sterilization of seed, cleanup of points of concentration, and the immediate destruction of cotton plants after the crop has been picked, thus providing a host-free period of about 6 months for the pink bollworm. Therefore, the outstanding event in this area in April was the examination, with negative results, of 10,092 fruiting forms, consisting of squares, blooms, and small bolls, in the Brownsville area of that district, and 4,075 forms in the adjacent Matamoros area of Mexico in cooperation with Mexican inspectors. Inspections in the Brownsville-Matamoros area were confined as nearly as possible to those fields known to be infested in 1938, or fields in close proximity. Examination of soil samples was also made during the month in the Brownsville area, and similar examinations were made in the Matamoros section in cooperation with Mexican inspectors. Soil samples were taken from the gin premises where first-cleaner trash is discharged, as well as where seed cotton was stored on the ground for a considerable period of time. Some samples were also taken from a known infested field of 1938. Each sample was 1 yard square and 4 inches deep. The top and bottom 2 inches of soil of each sample was washed and examined separately. These examinations were also negative. Laboratory inspection of preserved bolls at the San Antonio and field station laboratories was negative during April.

Wild-cotton eradication in southern Florida.--An eradication program has been carried on in southern Florida for a number of years for the

purpose of eliminating the heavy pink bollworm infestation in that area by destroying its host--wild cotton--and thus preventing its spread to cultivated plantings in northern Florida and southern Georgia. This work has been carried on with excellent results, and very satisfactory progress was made during the month toward recleaning wild-cotton colonies for the second time during the current season. Not a single fruiting wild-cotton plant was found in the Bradenton and Fort Myers subdistricts during the second cleaning, which was carried on during April. A total of 120 acres was recleaned in the Bradenton subdistrict and only 396 seedling plants found. In the Fort Myers subdistrict 421 acres was recleaned for the second time and only 1,945 wild-cotton plants were found. In the Ten Thousand Islands section 386 acres was recleaned for the second time and only 40 plants with mature bolls and 1,650 seedling plants were found. These figures are very gratifying and indicate that the number of wild-cotton plants found in that section is on the decline. Work at Cape Sable, which was temporarily brought to a close on March 28, was resumed on April 11, and the second cleaning for the season in that section was completed on April 23. The entire Cape Sable area was cleaned twice during the season, which is now drawing to a close, because, on account of climatic conditions, effective work in this area of Florida can be done only during the fall, winter, and early spring. During the month at Cape Sable, 2,292 acres was covered and only 468 wild cotton plants with mature bolls and 15,998 seedling plants were found. This is an average of only 7 plants per acre, which is a very low average compared with former cleanings. In the Matecumbe and Key Largo sections 924 acres was covered for the second time during the season and 161 plants with mature bolls and 4,053 seedling plants were removed. In the Biscayne Bay Keys 255 acres was covered. No fruiting plants were found and only 350 seedlings were removed. In the Key West, Marathon, and Long Key sections, 151 acres was covered, 4 plants with mature bolls and 5,922 seedlings being found and removed. A light infestation of the pink bollworm was found in the Key Largo area during April.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Cabbage caterpillar control measures used in South Carolina inadequate.--In summarizing the data from 7 surveys made from 1935 to 1938, inclusive, of the damage caused by cabbage caterpillars in South Carolina, W. J. Reid, Jr., and C. O. Bare, of the Charleston, S. C., laboratory, report that approximately 20 percent of the total number of cabbage plants examined during the course of these surveys (constituting approximately 25 percent of the plants that otherwise would have been marketable) were classed as being ineligible for U. S. Grade No. 1, because of injury by cabbage caterpillars, despite the fact that most of the plants examined had received some type of insecticide applications by the growers. The accumulated data from the 26 fields of cabbage indicated that, in general, inadequate control was obtained by the growers and that the percentages of damaged plants ranged from approximately 2 to 63, while more than 90 percent of the caterpillars that completed their development on the plants did so after the plants had begun heading. The results of these surveys demonstrated conclusively the necessity for the growers adopting more effective control measures for cabbage caterpillars than those now in use, especially during the period of plant development. The principal species of cabbage caterpillars involved in these surveys were the larvae of the diamondback moth

(Plutella maculipennis (Curt.)), the cabbage looper (Autographa brassicae (L.)), the imported cabbage worm (Pieris rapae (L.)), the cabbage webworm (Hellula undalis (F.)), and several species of Agrotinae, including the corn ear worm (Heliothis armigera (Hbn.)).

Relation between various crops and wireworm populations.--K. E. Gibson, of the Walla Walla, Wash., laboratory, reports that during the course of wireworm-sampling operations in approximately 90 plots grown in a rotation series at the experiment station at Prosser, Wash., it was found that the plots which were in wheat in 1938 carried the highest wireworm populations, averaging approximately 11 per square foot, whereas the plots that were in alfalfa for 3 years exhibited the lowest population of any of the series, averaging approximately 2.4 per square foot. Potatoes were found to provide the best conditions for larval survival of any of the crops grown in this series, approximately 28 percent of the larvae found in the 1938 potato plots having produced adults. During the process of determining wireworm populations of 69 fields in the Walla Walla Valley, E. W. Jones found that soil that had produced potatoes in 1938 averaged the highest wireworm population, approximately 9 larvae per square foot, whereas fields that had been in alfalfa in 1938, located on well-drained land, represented the lowest wireworm populations of the series, averaging approximately 1 per square foot. It was found that onions supported relatively low wireworm populations, of 2 or less per square foot. The wireworms involved in these observations consisted principally of the sugar beet wireworm (Limonius californicus (Mann.)) and the Pacific coast wireworm (L. canus Lec.).

Frequent applications of pyrethrum-dust mixture protect turnips from injury by vegetable weevil larvae.--K. L. Cockerham and O. T. Deen, of the Sunset, La., laboratory, report that small-scale experiments in February demonstrated that Listroderes obliquus (Klug.) infesting purple-top turnips could be controlled by three applications, at weekly intervals, of a dust mixture composed of equal parts by weight of pyrethrum and talc, which contained approximately 0.51 percent of total pyrethrins. Examinations of the treated turnips at weekly intervals during the latter half of March disclosed that the vegetable weevil larvae were present in limited numbers and that the treated plants had produced a new growth. The untreated turnips, on the other hand, showed many more larvae present, even though during the latter part of the month many larvae had descended into the soil for pupation. The untreated plants appeared riddled and ragged and were not as vigorous or as free from weevil injury as those treated with the pyrethrum-dust mixture.

Susceptibility of beet leafhopper host plants affects rate of exhaustion of food reserves and vitality during overwintering period.--Physiological studies performed by W. C. Cook and C. H. Feltes, of the Modesto, Calif., laboratory, demonstrated that adults of Eutettix tenellus (Bak.) confined during the winter on sugar beets, a favorable host plant, lose fat and vitality until approximately the month of January, when they begin to lay eggs; whereas on desert saltbush or allscale (Atriplex polycarpa (Torr.) S. Wats.) an unfavorable host plant, the loss of fat and vitality is much more rapid than on sugar beets. Leafhoppers held for periods of 66 and 88 days on A. polycarpa regained their normal fat content when placed on sugar beets.

Paris green baits for mole cricket injure Italian ryegrass.--Experiments by J. N. Tenhot, of the Sanford, Fla., laboratory, disclosed that poisoned baits for Scapteriscus spp. which contained zinc phosphide, sodium fluosilicate, or calcium arsenate at the dosage recommended for combating these pests, did not injure Italian ryegrass, which is used very extensively on golf courses in Florida during the winter season, but that poisoned baits containing paris green, used under identical conditions, caused very severe injury to this grass. In the course of these experiments each of the poisoned baits was broadcast on the ryegrass sod at the rate of 1 pound (dry weight) of bait to each 400 square feet of sod. Two tests were made of each bait, one on unthrifty drought-injured ryegrass and the other performed on luxuriant, very tender ryegrass. The baits containing paris green caused very severe injury on all plots, but no injury was noted on any plot where baits containing zinc phosphide, sodium fluosilicate, or calcium arsenate were applied.

Four species of aphids found to transmit narcissus mosaic virus.--F. S. Blanton, of the Babylon, N. Y., laboratory, reports that tests conducted in the greenhouse and in the field have shown definitely that the virus of narcissus mosaic is transmitted by four species of aphids, namely, the bean aphid (Aphis rumicis L.), the potato aphid (Illinoia solanifolii (Ashm.)), the rose aphid (Macrosiphum rosae (L.)), and the aphid Myzus convulvuli (Kalt.). In tests made to determine the number of aphids of these species necessary to transmit the virus causing narcissus mosaic, the evidence obtained was not sufficiently complete to determine its significance. Natural transmission of the narcissus mosaic in the field in 1938 was very high, owing to the abundance of the four species of aphids enumerated. Detailed studies of the narcissus mosaic brought out the fact that, while several varieties of narcissus were more susceptible to disease than others, none of the varieties upon which observations have been made thus far are completely immune; that the disease is not spread by the picking or cutting of flowers, by root contact, or by root injury; that diseased bulbs produce inferior flowers and transmit the disease to their vegetative progeny; that bulbs once infected never recover from the disease; that the only evidence of an effective control of the bulbs infected by the narcissus mosaic is by removing such bulbs from the planting stock through the medium of "roguing" early in the season before any of the vectors have had an opportunity to transmit the disease to healthy bulbs; and that thermal treatments of bulbs infected by the narcissus mosaic will not inactivate the virus, even though such treatments are performed at such a high temperature as to practically destroy the value of the bulbs.

Soil moisture and temperatures distinctly associated with injury by bulb scale mite.--Recent experiments by Ralph Schopp, of the Sumner, Wash., laboratory, have disclosed that soil moisture and temperature are distinctly associated with the presence of injury in narcissus bulbs infested by Tarsonemus laticeps Halbert, when the bulbs are forced in the greenhouse. The character of these environmental factors during the period when the bulbs are rooting in flats preceding the actual greenhouse forcing operation was shown to determine the extent of injury by this mite. It was found that lower temperatures reduce the populations of the bulb scale mite, as well as its activity, and that increased soil moisture also decreases the mite population. Results of tests thus far indicate that there is probably some inter-reaction between these two factors. These tests were performed with

potted bulbs in four different types of environmental conditions with 2° of moisture, in addition to starting one series outdoors and another series indoors.

INSECTS AFFECTING MAN AND ANIMALS

New pumping station in Florida aids control of sand fly and salt-marsh mosquito.--S. E. Shields reports that a new pumping station has just been completed and put into operation on the diked mangrove marsh opposite Fort Pierce, Fla., where control of sand flies and salt-marsh mosquitoes is being sought. This new installation, made by the Saint Lucie County Anti-mosquito District, will provide more adequate control of water levels in the 1,100-acre area now under dike. The station provides three $1\frac{1}{2}$ by $5\frac{1}{2}$ ft. tide-gates, to permit discharge of water from behind the dikes during low tides, and two impeller-type pumps operated by second-hand automobile engines and capable of discharging approximately 12,000 gallons per minute.

FOREIGN PLANT QUARANTINES

Airplane from Europe carries prohibited fruit.--When the American flying boat, the "Yankee Clipper," arrived at Baltimore on April 16 from Southampton, England, via Portugal, Azores, and Bermuda, inspectors Ranck and Vinzant intercepted four South African oranges and three oranges from the Azores in the ship's stores.

Banana leaves used as packing material.--A banana producer in Guatemala recently conceived the idea of removing the "hands" from 450 stems, packing them in banana leaves and then placing them in mahogany crates. As Fruit and Vegetable Quarantine No. 56 prohibits the use of leaves and plant litter for packing purposes, it was necessary upon arrival of the shipment at San Pedro, Calif., to require the removal of the objectionable material before releasing the fruit. The importer provided a crew of laborers who unwrapped and removed all of the leafy trash from each crate, placing each set of "hands" in separate boxes, after which the leaves and crates were collected and burned and the bananas released.

Correction.--On page 24 of the News Letter dated May 1, 1939, the host for the pyralidid Hellula phidilealis (Wlk.) should have been given as white chard, instead of Swiss chard.

Entomological interceptions of interest.--Two living immature specimens of the weevil Anthonomus rectirostris T. were intercepted at Washington, D. C., on January 13, 1938, in hazzard (Prunus avium) seed in the mail from Czechoslovakia. A. G. Boving reports that this species is doing noticeable damage to cherry trees in Europe, especially in middle and southern Europe. Specimens of the fruitfly Anastrepha fraterculus (Wied.) were intercepted at New York on July 18, 1938, in cherinoya (Annona cherinola) fruit in baggage from Peru. Five living larvae of the Mexican fruitfly (A. ludens Lw.) were intercepted at El Paso, Tex., on March 9 in a desecded avocado in baggage from Mexico. The larvae were feeding in healthy tissue of the fruit. The scale insect Lepidosaphes hawaiiensis (Mask.) was taken at Miami, Fla., on February 17 on croton in baggage from Cuba. A living adult of the chrysomelid Plagioderma flosculosa Stal was intercepted at San Francisco on January 6 with

orchids in express from Mexico. An adult of the weevil Rhina scrutator Oliv. arrived at Boston on December 6, 1938, on dried herbs in the mail from Montserrat. Living and dead larvae of the bean pod borer (Maruca testulalis Geyer) were found at New Orleans on January 23 in string bean pods in ship's stores from Brazil. Living specimens of the quohog-shaped scale (Targionia quohogiformis Merrill) were intercepted at Honolulu, T. H., on July 1, 1938, on Dendrophylax funalis in the mail from Jamaica. Adults of Bruchidius alfieri Pic. and B. trifolii Mots. were taken at Washington, D. C., on November 8, 1938, in Trifolium alexandrinum in the mail from Czechoslovakia. Living specimens of the scale insect Parlatoria camelliae Comst. arrived at Seattle, Wash., on December 15, 1938, on camellia foliage in cargo from Japan. Living specimens of the pyralidids were taken as follows in September 1938 in the field in Guam: Nacoleia diemenalis (Guen.) on Desmodium gangeticum, and Sylepta derogata (F.) on Hibiscus tiliaceus. Two living larvae of the pink bollworm (Pectinophora gossypiella Saund.) were intercepted at New York on January 20 in two cottonseeds in baggage from Haiti.

Pathological interceptions of interest.--The first interception of Claviceps paspali Stevens and Hall since 1926 was made on April 13 at New York in Paspalum seed from Costa Rica. A tomato from Mexico intercepted at Nogales on April 11 had what appeared to be "cloudy spot," the cause of which is unknown. Gloeosporium sp., with spores too long for G. oncidii Oud., was intercepted at San Francisco on March 31 on Oncidium pulvinatum in cargo from Brazil. Glomerella cincta (Ston.) Spauld. and v. Schrenk. was intercepted on March 23 at New York on the leaves of a dracaena from Italy. Gymnosporangium japonicum Syd. was intercepted at Seattle on April 8, on a juniper in baggage from Japan. Heterodera marioni (Cornu) Goodey was intercepted on special permit violet plants in mail from Japan on February 24, at Seattle. Peronospora pisi (De B.) Syd. was found in green peas from Italy on April 24 at New York. Phomopsis mali J. W. Roberts was found on apples from Japan on February 24, at Seattle. Pleospora ephedrae Speg. was intercepted on Ephedra sinica in mail from Japan on March 27, at New York. Pratylenchus pratensis (de Man) Filipjev, but varying from the type, was found in yams in baggage from St. Vincent, B. W. I., March 27, at Boston. Rhytisma erythrorum Berk. and Curt. was found on oak leaves accompanying cargo from Mexico on March 27 at Galveston. Scirrhia rimosa (Alb. & Schw.) Eckl. was intercepted on Phragmites communis in mail from Belgium on February 15 at New York. Septoria hepaticae Desm. was intercepted at New York on April 27 on Hepatica triloba leaves on a clump in baggage from Norway. Sorosporium reilianum (Kuehn) McAlp. was intercepted in broomcorn on March 27 at Boston in cargo from Hungary.

DOMESTIC PLANT QUARANTINES

Grasshopper developments.--Hatching of economic species of grasshoppers had begun in the week ended April 22 in Arizona, California, Texas, New Mexico, and Oklahoma. A severe outbreak of Melanoplus devastator Scudd. was reported in the San Joaquin Valley of California and heavy baiting operations were begun that week. Reports of threatening, severe infestations were also received from the Yuma Valley area of Arizona. A week later two of the most important economic species, the two-striped grasshoppers and the migratory Melanoplus mexicanus Sauss. were hatching in Wyoming and western South Dakota and also the big differential hopper in northern Texas and

southern Oklahoma. By the first week in May the economic species were reported to be hatching in every infested State except a few in the Mississippi Valley north of Arkansas. The migratory range species in the southern part of the infested area in New Mexico had a population ranging up to 1,500 per square yard, while the migratory species of the northern Great Plains was hatching in western North Dakota and eastern Montana. Results of surveys this spring indicate that the extent of parasitization and predatorization remains practically the same as that reported last fall. Reduction in numbers of egg pods by natural factors during the winter has been negligible.

Grasshopper baiting and baiting materials.--Shipments of bait materials were made the week ended April 22 to counties in California, Colorado, Idaho, Nevada, Montana, North Dakota, Oklahoma, South Dakota, New Mexico, and Texas. Many local transfers of bait material were arranged within the States between counties having a surplus and those in need of materials. It is expected that the entire needs of several States will be met in these transfers. Approximately 50 percent of the estimated needs were on hand by May 1 in the infested States, or had been shipped. Sufficient bran to mix several thousand bait-tons has also been placed in strategically located storage plants. Large-scale baiting operations were begun in New Mexico, California, Arizona, and Nevada the first week in May and mixing operations were under way in parts of Montana and South Dakota.

Cooperation in grasshopper baiting.--Excellent cooperation in furnishing assistance in hauling grasshopper bait and bait materials, in the construction of mechanical bait spreaders and bait mixers, in the promotion of educational and organizational work, and in other phases of grasshopper control work has been rendered by the Extension Service in the various States and by the Soil Conservation Service, the Civilian Conservation Corps, and other Federal agencies, as well as by the State highway departments of several States, and local commercial groups and organizations. The setting up and operation of bait-mixing stations in many States by the Works Progress Administration and the Farm Security Administration is valuable assistance. The State of New Mexico has appropriated \$70,000 for supplying the necessary sawdust in that State this season. About \$2,500 has been raised locally by two New Mexico counties. Benefit dances are held in some places, the proceeds to be used for grasshopper control.

Technical service unit on grasshopper control project.--Three supervisors are working under the direction of R. L. Shetwell obtaining detailed, scientific information as to grasshopper egg development, parasitization, predatorization, and probable time of hatch of the various infestations, and devising a practical adaptation of present survey methods for use on range lands.

Mormon cricket control in progress.--Mormon cricket control operations were under way in April in Oregon, Washington, Idaho, Nevada, and Utah, and to a limited extent in Wyoming. Cold and windy weather in Montana, Nebraska, South Dakota, and Wyoming retarded the cricket hatch in most areas of these States and necessitated delay in dusting. A machine for mixing poison dust is being constructed at Billings, Mont., in order to supply that State with mixed dust for the work this season. Control operations in April were devoted for the most part to dusting of crickets on the

egg beds and in crop lands or areas adjacent thereto. Power dusting was stressed in areas where this type of machine is practicable and this work was supplemented with hand dusting and with barriers of metal, of oil-on-water, and of trenches. Control was uniformly successful, the percentage of kill estimated at from 80 to 100 percent. In many areas cricket bands were eradicated or greatly decreased before crop lands were entered. Only limited damage to crops was reported. Some 80,000 pounds of mixed dust was used on nearly 17,000 acres of crop and range land, of which over half was covered by power dusting and the remainder by hand.

Surveys of Mormon cricket damage continued.--The survey which was conducted in 1938 to determine Mormon cricket damage to cultivated crops and range plants is being continued this year on a much wider area of vegetation types. Samples of representative damage are being taken in the several infested States, particularly those having the greatest concentration of crickets. New plots to study recovery of severely injured plant species are being established, and sampling based on the point-observation-plot method of range survey is being undertaken. In addition to such work, which is conducted by two specialists, all supervisors are reporting their observations in the various counties and providing photos of damage.

Phony peach and peach mosaic control work.--Inspection and tree-removal work was carried on in April jointly with the States, and under allotments from emergency funds, in Alabama, Arizona, Arkansas, California, Colorado, Georgia, Mississippi, South Carolina, Tennessee, Texas, and Utah. Over 1,500,000 abandoned, escaped, or diseased trees were destroyed.

Peach mosaic found in two more counties.--Early in April two peach seedlings infected with the mosaic disease were found in the northern part of Imperial County, Calif., near Calipatria. The disease has not previously been found in this county. Peaches are not grown extensively in Imperial County and there are no nurseries growing peach stock in the Imperial Valley. Mosaic infection was also found in Jones County, Tex., for the first time. On a commercial property having 112 peach trees, 110 were heavily infected.

Other findings of peach mosaic.--A considerable increase in number of mosaic infected properties at San Bernardino, Calif., is reported, involving, however, only 1 or 2 diseased trees to the property in most cases. Tree-removal work was carried on in April in Riverside, San Bernardino, Los Angeles, and Imperial Counties with 151 relief laborers. They effected the destruction of 3,500 abandoned peach trees and 456 diseased trees. In the Palisade area of Mesa County, Colo., inspection conducted on the more heavily infected properties resulted in finding 1,591 mosaic trees the first week. A force of 36 Bureau, State, county, and emergency-relief inspectors worked the area that week. Growers have cooperated 100 percent with the work in that area. In the Dixie area of Utah the first inspection showed an increase of about 500 percent in infected trees, as compared with the numbers found in the 1938 season. All diseased trees were removed. Nursery and budwood environs inspections in Texas, conducted by 13 Federal and State inspectors in 2-man crews, have completed work in the area regulated under the State quarantine, with the exception of 1 county. Peach mosaic was found in 7 counties where the disease was known to exist last year, including Smith County, a large nursery producing county. Over 1,000 diseased trees were

found in the El Paso area and the work is not complete. Tree-removal work in Texas is now concentrated in Smith and Brown Counties, with a labor force of 60 men.

White-fringed beetle inspection and control.--Larval inspection in the area infested with white-fringed beetles at Mobile, Ala., in April resulted in finding no larvae, giving a favorable indication of the efficacy of last year's control measures. Inspection at Monroeville, Ala., in woodland adjoining an infestation resulted in finding no larvae beyond a short distance in the woods. One new infestation was found at Baton Rouge, La., and one at Florala, Ala. Larval injury to cultivated crops was found at Florala, Beatrice, and Repton, Ala., and severe damage to fields in Carriere and Saucier, Miss. At Long Beach, Miss., in a field containing 122 hills of cantaloups, all but 25 were killed by white-fringed beetle larvae. Cleanup operations were conducted in Mobile and Florala during the month. Spray machines and the dusting machine have been improved by the construction of devices that increase the output.

Regulatory work in white-fringed beetle area.--Movement of Irish potatoes has increased greatly, necessitating inspection at the New Orleans markets from 2 a.m. till 10 p.m. Over 1,200 permits were issued for potatoes and over 2,000 permits for movement of nursery stock with soil, all from the New Orleans area. Nearly 10,000 plants in that area were fumigated with methyl bromide. Soil sterilization operations at 2 nurseries have been completed with 81,500 square feet of soil having been sterilized for plunging beds. A number of violations of the quarantine consisting, for the most part, of plants with soil transported by various individuals, were intercepted. At Saucier, 2 carloads of rosin, of which large quantities are shipped to England, were inspected, to insure that no soil was being transported therewith.

Quarantine circular issued to nurserymen in white-fringed beetle areas.--Suggestions as to types of plunging beds or growing beds which may be constructed, and which, together with the use of barriers and other protective measures should be effective in preventing natural infestation by the white-fringed beetle, have been provided to nurserymen through circular B. E. P. Q. 496, dated April 23.

White-fringed beetle certification requirements suspended as to additional area.--Under a revision of circular B. E. P. Q. 485, which became effective May 8, three Louisiana parishes were added to the area from which certification requirements under the white-fringed beetle quarantine were suspended until July 1, as to restricted articles free from soil. These parishes are Jefferson, Plaquemines, and Orleans, including the city of New Orleans.

Sweetpotato weevils diminishing.--Recent results of trapping sweetpotato weevils in Baldwin and Mobile Counties, Ala., indicate there has been a decided decrease in the adult weevil population in that State in the last year. This practice of placing occasional sweetpotato tubers into cleaned fields and later removing them with the feeding weevils has been found effective in indicating the trend of the population. Alabama-sponsored W. P. A. crews continued, in March, to clean infested properties and those adjacent by plowing and removing host material. Inspections of plant beds, of storage

places, and of wild host plants in the infested areas were conducted in that State. In Georgia control activities were carried on in 11 counties and eradication measures in Thomas County. Host material brought into Georgia and Mississippi for planting purposes, without compliance with the sweetpotato weevil quarantines of those States, was promptly confiscated by State inspectors. Work in Texas during the month consisted of eradication, control, and surveys in several counties. Throughout the month 18 infestations were reported, all from Alabama.

Citrus canker eradication.--The Bureau continued inspection work in Louisiana jointly with the State until April 15, when 2 of the Federal men were transferred to another project and 2 returned to inspection in Texas. In the period since the first of the year, inspections in Louisiana were made on 4,600 properties in 14 counties, including a number of properties infected in former years, and of the area surrounding them. The only finding of citrus canker was on a property in Terrebonne Parish reported by State inspectors on January 11. In Texas 2 crews of 2 men each inspected Galveston and Texas City and 7 men conducted inspection and supervised labor crews "strip working" areas where Citrus trifoliata had been found in Brazoria, Galveston, and Harris Counties, including wooded areas where seedlings of this species are sought out and destroyed. In these inspections 7 formerly infected properties yielded no canker. In Galveston 3 weeks' work by 2 to 4 inspectors accomplished the inspection of 849 properties having 1,698 dooryard citrus trees, only 11 of which were Citrus trifoliata.

Transit-inspection work.--Transit inspection is now carried on the year round at 13 stations, with seasonal coverage in nursery stock shipping seasons at 4 other points. There is at present a force of 34 inspectors, of which 16 are employed by this Division and 18 by cooperating State agencies or by quarantine projects of other divisions of the Bureau. In April 377 violations were intercepted, including 2 infringements of the white-fringed beetle quarantine, 1 of which was intercepted at Saint Louis and 1 at Cincinnati.

Carriers cooperate in transit inspection.--Through the assistance of Railway Express Agency employees, the transit-inspection office in Chicago was recently provided with a count of the number of plant shipments that arrived by express in that city over an 8-day period. There were 23,539 such shipments reported as unloaded at the 9 stations. Details were provided as to train numbers and time of arrival and number of shipments. These figures are of great assistance in working up tours of inspection. Similar information from freight houses and trucking companies has also proved useful.

Interceptions of interest.--From Pittsburgh comes the report of the interception of a number of dahlia tubers for lack of Japanese beetle certificates. Dahlia tubers, other than single tubers, were brought within the regulations of this quarantine in the revision which became effective on February 20. Some of these dahlia shipments were also violations of State quarantines relating to the European corn borer. A New York inspector reports the interception of a shipment to Alaska of uncertified apple cuttings from the gypsy moth area. A Boston inspector found a shipment labeled, "Glass-Handle with Care," and waybilled as glass, which contained a shrub in soil.

CONTROL INVESTIGATIONS

Specificity of insecticides.--In biologically evaluating household insecticides it has been the custom to use the housefly (*Musca domestica* L.) as the test insect. Resultant toxicity values are assumed to be valid against the roach, bedbug, and like insects, even though it is well known that some insecticides possessing high toxicity to certain groups of insects are worthless against others. With this in mind, two different household insecticides were tested by W. N. Sullivan and others at the Beltsville, Md., laboratory of this Division in a preliminary manner against the American cockroach (*Periplaneta americana* (L.)) by the turntable method, using concentrations adjusted to give similar kills against the housefly. The results of these tests to date indicated that, though insecticide A and insecticide B were equally effective against the housefly, insecticide B was much superior against the roach. As it is the control of the roach or bedbug that is of primary importance to many establishments buying large quantities of insecticides on the basis of their biological evaluation, it would appear that this rating should be on a broader basis than is now in use.

INSECTICIDE INVESTIGATIONS

Progress in the chemistry of pyrethrum flowers.--In the May 1939 issue of Pests (v. 7, No. 5, pp. 9, 10), H. L. Haller and F. B. LaForge, of this Division, outlined a new method for the determination of pyrethrin I and pyrethrin II in pyrethrum flowers. Upon hydrogenation these constituents are split with the formation of acids which are separated by steam distillation and determined by titration. A number of practical details remain to be worked out, but the method looks very promising.

Effect of temperature and light on the decomposition of derris.--A study of this subject has just been published by R. D. Chisholm, of the Moorestown, N. J., laboratory (Soap, v. 15, No. 5, pp. 103, 105. May 1939). He found that derris deposits were decomposed, both in the presence and in the absence of sunlight. The rate of decomposition was increased when the temperature was increased. After exposure for 15 days to sunlight at 32.5° F., an average of 60 percent of the deposit was decomposed, whereas 73 percent was decomposed at 70-75°, even though the latter deposits were subject to the screening effect of greenhouse glass. In the absence of light and at similar temperatures there was no measurable change; however, when the temperature was increased to 120° about one-fourth of the deposit was decomposed.

N-nitrosodiphenylamine.--A patent covering the use of this compound as an insecticide was issued on April 18, 1939, to A. F. Freeman, formerly of this Division. This patent, U. S. 2,155,010, reports that N-nitrosodiphenylamine is as effective as lead arsenate used on the imported cabbage worm and also on the cross-striped cabbage worm, and that on the southern army worm it is more effective than barium fluosilicate.

BEE CULTURE

House-cleaning behavior of honeybee important factor in resistance to American foulbrood.--A variation in the time required by different colonies to remove larval remains infested with foulbrood from the hive was reported in a recent number of the News Letter (v. 6, No. 3, pp. 25-26. March 1, 1939). It has now been observed that degree of resistance to this disease is not entirely correlated with the rapidity with which the disease remains are cleaned out. A. P. Sturtevant, in charge of the American foulbrood resistance studies at Laramie, Wyo., reports: "It has been observed that in a large number of cases, healthy brood has been reared in cells from which diseased remains have been cleaned out, the house-cleaning having been done so effectively that brood reared in such cells becomes infected from being given infected food rather than from diseased material remaining in the cells. Continued studies of the behavior of different strains of bees toward brood infected with American foulbrood have further indicated, however, that there is a considerable variation in the rapidity of removal of diseased remains between colonies of different strains and even between colonies with sister queens, not entirely correlated with past history of strain resistance. Furthermore, preliminary tests made with eggs from queens of various strains placed in brood nests of heavily diseased colonies failed to show significant differences in physiological resistance between the brood of susceptible- and that of resistant-strain colonies. These observations indicate that the house-cleaning activity behavior character probably plays an important part in so-called disease resistance."

IDENTIFICATION AND CLASSIFICATION OF INSECTS

Hypera postica (Gyll.) and H. brunneipennis (Boh.)--The alfalfa weevil (H. postica) and the Egyptian species (H. brunneipennis), recently discovered in Arizona, are very closely related and absolute characters for distinguishing individual specimens in the adult stage have not been observed in the preliminary study of rather limited material made thus far. However, the following average differences are rather distinct when series are available for examination: In length H. postica ranges approximately from 4 to 5.5 mm. and H. brunneipennis 4.5 to 6 mm., a series of the latter averaging 0.5 mm. longer than postica. The elytral length is to the pronotal length about as 14 is to 5 in postica and about as 16 is to 5 in brunneipennis; this, in conjunction with the greater body length of brunneipennis, gives this species a more slender appearance than in the average postica. In some males of postica the sides of elytra are more or less convergent posteriorly throughout most of their length, whereas the males of brunneipennis have the sides of the elytra subparallel. From one-third to one-half of the postica specimens examined have the dark scutellar patch evident, or at least the suture and base of interval 3 dark; in brunneipennis almost uniformly pale brownish specimens are fairly common, others are brownish with small fuscous spots or tessellations, and still others have a dark scutellar patch which, however, is never as sharply defined as in some specimens of postica. The dorsal setae are somewhat finer, more abundant, and less appressed in brunneipennis, often forming a crowded, double row on some parts of some of the elytral intervals; the less appressed nature of the setae in brunneipennis is usually apparent on the elytral humeri and on the lateral margins of the prothorax. Finally, the scales seem to be a little smaller and relatively broader in brunneipennis. As yet

no differences have been found, on examination of a very small quantity of material, to separate the two species when in the larval stage. However, the few cocoons that have been available are apparently distinguishable, even with a hand lens. Those of brunneipennis are of finer mesh, the interstices between the fibers being smaller than those of postica. Only a comparatively small number of cocoons have been examined, however.

Abnormality in a larva of the white-fringed beetle.--A prothetelic larva, identified by W. H. Anderson as almost certainly Naupactus leucoloma Boh., was collected in New Orleans by E. M. Livingston and submitted recently for determination. In common with prothetelic larvae in general, paired wing pads are present on mesothorax and metathorax. In addition, however, there are three pairs of well developed, although pupiform, legs, which, of course, are absent in normal weevil larvae. It would seem that the definition of prothetely should be extended to include a condition such as exhibited by this specimen.

A Japanese aphid on shallot onions in Virginia.--Specimens of aphids on shallot onions received from Lauren D. Anderson, of the Virginia Truck Experiment Station, have been determined by P. W. Mason as Micromyzus formosanus Takah.). This species was redescribed by Essig in 1935 as Micromyzus alliumcepa from onions, chives, and leeks in California. There appear to be no other records from the United States. In Japan and Formosa, Takahashi has recorded it from Allium fistulosum, Allium scorodoprasum var. viviparum, Lilium fistulosum, and Lycoris sanguinea. Mr. Anderson states: "These aphids are very abundant and are doing considerable damage."

Interesting scale insect on bamboo described.--A very peculiar bamboo coccid of uncertain relationships, which has stood unnamed in the Bureau coccid collections since its receipt in 1916 from Harry B. Weiss, who obtained it at Riverton, N. J., on Bambusa metake from Japan, has just been described from that country as Idiococcus bambusae Takahashi and Kanda (Ins. Matsumur. 18 (1939), p. 52). Presumably it has not established itself in this country, as no collections other than the original one have ever been received.

Some recent additions to the reference collections.--A collection of Australian leafhoppers, consisting of 63 specimens representing 39 species, has recently been received from J. W. Evans of Hobart, Tasmania. Most of the species were not heretofore represented in the collections of the National Museum, and consequently add considerably to the value of our collections from that region. It is believed that the material will be especially helpful in generic studies now in progress. A small but valuable collection of weevils from Brazil has been presented by Edson J. Hambleton. This comprises 16 species, including several species of the genus Naupactus and other relatives of the white-fringed beetle. There have also been received 15 Schmitt boxes of cactus insects from Leith F. Hitchcock, of the Australia Prickly Pear Board. This material, containing some interesting and valuable items, was forwarded for incorporation in the National Collection.

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VOLUME VI

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

NEWS LETTER

FOR MAY 1939

Vol. VI, No. 7

(Not for publication)

July 1, 1939

ADMINISTRATION

Bisset Retires

Peter Bisset, senior horticulturist in charge of the Washington Inspection House, retired on April 30, 1939. Mr. Bisset entered Government service in 1909, when he accepted an appointment in the Office of Plant Introduction, Bureau of Plant Industry, and was placed in charge of the plant distribution of that office under David Fairchild. On July 1, 1926, he transferred to the Federal Horticultural Board as horticulturist in charge of the plant-inspection house, where he has rendered invaluable service to importers of plants. Mr. Bisset is one of the Nation's outstanding figures in the development of American horticulture and many letters of commendation from prominent nurserymen, botanists, and horticultural leaders of the country attest to his abundant knowledge and his expert handling of a wide variety of rare and valuable plant importations. He received his early training in Scotland and the superior knowledge of the care of plants, received in that country, served as an excellent background for the responsible position which he held for so many years.

Supplemental Grasshopper Appropriation

The funds available to the Bureau for cooperation with States and local agencies to control grasshopper outbreaks were so depleted on June 6 that it was necessary to advise cooperating States that the Bureau would be unable to continue with the cooperative program then underway after June 10. A supplemental estimate which would provide \$1,750,000 was approved by the President on June 10 and this amount was appropriated by Joint Resolution passed by both Houses of Congress on June 12. Following this action instructions were sent to the field to resume the cooperative program at full speed. The situation regarding the grasshopper outbreak is acute, particularly so in the Northern Plains States, where the lesser migratory hopper is occurring in tremendous numbers, and migrations which may originate in the publicly owned and uninhabited depleted range lands threaten the cultivated crops in wide areas.

FRUIT INSECT INVESTIGATIONS

Headquarters for subtropical fruit insect investigations moved.--

On May 10 the headquarters for the work on citrus and other subtropical fruit insects, located for a number of years at Orlando, Fla., was moved to St. Lucie, on the East Coast of Florida, near Fort Pierce. The investigations now underway at Orlando will be continued. The new location places the headquarters nearer to the Indian River section, where some of the work can be carried on to better advantage, and also nearer to certain crops other than citrus to which attention is being given. This work includes studies of the insects affecting papaya, avocado, mango, and pineapple. The new laboratory is located on the Indian River water front, about 3 miles north of Fort Pierce, and may be reached from Fort Pierce by taking U. S. Route No. 1 north to the town limits, then following State Road 140 north to St. Lucie Boulevard, east on the boulevard to the water front, and turning south to the third house. The post office address is Box 112, Fort Pierce, Fla., the telephone is Fort Pierce 183, the telegraph is Fort Pierce, and the express and freight address is U. S. Department of Agriculture, P. O. Box 112, Fort Pierce.

High catches of codling moths recorded in baits.--E. J. Newcomer reports that a combination of favorable conditions, including a week of warm weather and a test orchard in which there are an unusual number of codling moths, has resulted in record catches of moths in molasses baits at Yakima, Wash. Five baits operated in this orchard have caught 7,200 moths in 9 days, or an average of 160 moths per bait per day. The maximum number for 1 day for the 5 baits was 1,141 and 283 moths were caught on 2 successive nights in 1 bait. Other baits caught over 200 moths per night several times. The previous record was in 1928, when 558 moths were caught in 4 baits, including 209 in 1 bait in a single day.

Experiments with low-temperature control of dried-fruit insects.--

Exploratory work with the use of low storage temperatures for the control of various insects in dried fruits has been reported by Perez Simmons, of the Fresno, Calif., laboratory. Apparently all saw-toothed grain beetles were killed by exposures of 4 hours or more to temperatures around 0° F. At temperatures of approximately 32°, 32 days or more was needed for complete mortality. All larvae of the raisin moth were killed by exposures of 8 hours at temperatures ranging from -4° down to -10°; a few survived 24-hour exposures to temperatures of about zero. At temperatures averaging about 32°, 85 days was needed for complete mortality, and at 35° to 38° some raisin moth larvae survived an exposure period of 100 days. Larvae of the Indian-meal moth were all killed by 24-hour exposures to temperatures from -10° up to 7.5°. At 31° to 33° complete mortality was obtained with a 65-day exposure, and similar results were obtained at 38° to 41°. There is evidence that the cold-hardiness of the insects depends to some extent upon the temperatures to which they were exposed before the experiments were started.

Emergence of grape leaf folder.--The progress of emergence of adult *Desmia funeralis* (Hbn.) from overwintered pupae was indicated by means of malt-sirup bait traps operated in 7 vineyards in Tulare and Fresno Counties, Calif. by Dwight F. Barnes and George H. Kaloostian of the Fresno, laboratory.

Collections were made twice weekly from 21 traps, 3 in each vineyard. The record is as follows:

Date : Adults emerged:			Date : Adults emerged		
:Total :Per trap:			: Total:Per trap		
April:	:Number:	Number	:May:	:Number:	Number
4-----:	1	0.01	:: 2-----:	227	3.46
7-----:	59	.94	:: 5-----:	196	3.27
11-----:	225	2.68	:: 9-----:	183	2.18
14-----:	87	1.38	::12-----:	82	1.30
18-----:	247	2.94	::16-----:	113	1.34
21-----:	203	3.38	::19-----:	26	.41
25-----:	205	2.44	::23-----:	19	.23
28-----:	168	2.95	::26-----:	14	.22
			::30-----:	17	.20

First-brood larvae were observed in the field April 21, the first rolled leaves were seen May 1, and the first pupae on June 5.

MEXICAN FRUITFLY CONTROL

Record catch of flies in May.--The harvesting season for grapefruit picked for shipment came to a close at midnight of May 15. Such fruit as was actually harvested at that time was allowed to be sterilized and shipped. A few canneries operated until May 20 on fruit harvested for juicing only and for fruit that had been sterilized but failed to meet the grade requirements. This fruit was processed under contract for the Federal Surplus Commodities Corporation. Grove inspection in the regulated area resulted in the finding of 3 very light infestations in Valencia oranges. In Webb County 1 additional larval infestation was also found in grapefruit. The season's total of larval infestations to May 31 amounted to 2,129 within the regulated area and 9 outside of the regulated area. These last infestations were located as follows: Webb County, 7; Dimmit and La Salle Counties, 1 each. Traps in May took the largest number of flies for any 1 month since they have been operated. The total catch amounted to 4,970. This is more than twice as many as were trapped in February, when another record was broken. The tree-to-tree inspection for fruit missed by the harvesters was 95 percent complete on May 31. Some difficulty was encountered in obtaining the proper clean-up of abandoned and absentee-owned properties, but these groves amounted to a very small part of the total citrus planting.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Methyl bromide successful in mill fumigation.--R. T. Cotton, of the Manhattan, Kans., laboratory, says that methyl bromide was recently used to fumigate a small flour mill in Chicago, Ill. The fumigant was introduced into the machinery by means of a piping system. An excellent kill was obtained of insects planted in the milling units, although the dosage of 8.8 ounces per 1,000 cubic feet of space was not sufficient to kill insects outside the machinery.

Eight species of aegilops as new hosts of hessian fly.--According to Elmer T. Jones, Manhattan, nine species of Aegilops of hitherto unknown reaction to hessian fly development have been tested as possible fly hosts. In these tests appreciable infestations of puparia have been found to develop on Aegilops comosa, A. speltoides, A. ligustica, A. umbellulata, A. aucheri, A. variabilis, and A. sharonensis. Species are given in ascending order of infestation. Percentage of plants infested ranged from 30 percent for A. comosa to 80 percent for A. sharonensis. One species, A. caudata, was found to be entirely resistant to infestation.

F₂ wheat hybrids resistant to hessian fly in fall tests.--Mr. Jones, Manhattan, also reports that recent computation of fall infestation records obtained in the Springfield, Mo., fly tests show 8 F₂ populations of wheat hybrids in 63 rows to possess promise for resistance. The average plant infestation for the hybrids (all with fly resistance from spring wheat) was 36 percent, as against average infestations of 1.7 percent for all resistant and 86 percent for all susceptible checks of the parental strains. Infestations of populations of 6 crosses in which only 1 resistant plant was involved ranged from 25 to 51 percent, while populations of crosses with 2 resistant parents (Marquillo x Oro) x Marvel and (Marquillo x Oro) x Illinois No. 1 B38 averaged, respectively, 5 percent and 11 percent plants infested. Crosses tested involved Oro, Oro x Tenmarq, and Clarkan x Kawvale as susceptible and Marquillo x Tenmarq, Marquillo x Oro, Illinois No. 1 B38, IV C1 + #, Renacimiento, and Marvel as resistant parentals.

Range grasshoppers trapped with tin barriers.--F. A. Morton, Bozeman, Mont., states that migrating nymphs of the long-winged migratory grasshopper of the Great Plains (Dissosteira longipennis Thos.) can be easily trapped with galvanized tin barriers similar to those used in Mormon cricket control. In June 1938, two 100-foot lengths of 10-inch barrier were set up to form a V, with the apex leading over a dirt ramp into a small pen. In 2½ hours 60 gallons of 4th- and 5th-instar nymphs were trapped.

Grasshoppers versus cows as feeders.--Mr. Morton conducted experiments in 1936, 1937, and 1938 to determine the quantity of grass eaten by known numbers of range grasshoppers. From these experiments it was determined that 301,395 grasshoppers destroy enough vegetation to maintain an average-size cow on minimum feed. Where a cow requires 3 acres per month for subsistence rations, a population of 24 adult grasshoppers per square meter would consume all the feed and leave nothing for the cow.

Desiccation of Mormon cricket eggs reduces viability.--Frank T. Cowan and H. J. Shipman, Bozeman report that Mormon cricket eggs that have lost 25 percent of their moisture never give more than a 50 percent hatch when remoistened. When the moisture content was reduced 50 percent no eggs hatched. This indicates that dry weather late in the summer and fall may be an important factor in checking Mormon cricket outbreaks.

Second-generation tendency of European corn borer in Lake States.--A. M. Vance, Toledo, Ohio, reports considerable variation in the tendency of the European corn borer to produce a second generation, without diapause, in material collected from different fields in Michigan, Ohio, and Indiana, as indicated by the proportion of pupation observed. Corn borer

larvae from 31 fields selected at random were collected in October 1938, overwintered in cold storage, and forced to produce moths in March and April 1939. Rearings were made from the eggs of the F_1 generation thus procured under constant food and developmental conditions, and pupation was calculated at the end of a 40-day period. Each collection lot averaged 70 individuals. The percentages of pupating larvae were as follows: In 13 collections from Monroe and Wayne Counties, Mich.: 0, 0, 0, 0, 0, 1.1, 1.2, 1.6, 4.2, 4.4, 4.9, 5.3, and 17.8; in 16 collections from Lucas, Ottawa, Sandusky, and Erie Counties, Ohio: 0, 0, 2.1, 3.6, 5, 5.6, 7.7, 7.9, 25.5, 28.3, 36.4, 39.8, 41.5, 56.5, 67.6 and 69.4; in 1 collection from Logan County, Ohio: 15.8; and in 1 collection from Steuben County, Ind.: 0. No pupation occurred in 8, or 25.8 percent, of the 31 collections. The 3 lots of larvae exhibiting the highest pupation (each over 50 percent) were progeny of collections from near Huron, Erie County, Ohio. Less pupation occurred among the Michigan than among the Ohio larvae but, in general, the differences in the second-generation tendency were observed mainly as field-to-field variation, indicative of heterogeneity in the physiological condition of the corn borer at present in the region studied.

Status of European corn borer parasites in Eastern States at close of 1938.--C. A. Clark, Moorestown, N. J., reports as follows on the parasites of Pyrausta nubilalis Hbn. in the Eastern States: A total of 20,312 corn borer larvae, collected in the Eastern States area at the close of 1938, were reared in February and March 1939 to supply data on the field status of parasites there. Lydella grisescens R. D. was very scarce in the Malden, Mass., area. In the Taunton, Mass., area, parasitization of 20 percent was recorded. L. grisescens had increased its distribution in 1938 at both Taunton, Mass., and East Hartford, Conn. This parasite was found to have maintained itself at Atlantic, N. J., but was not yet abundant. A great increase, both in dispersion and parasitization of the borer by L. grisescens, occurred in the Lee, Va., area. The survey here indicated that the tachinid was present over a territory in excess of 70 square miles and averaged 9.5-percent parasitization in the fall of 1938, as compared to only 0.6 percent in the fall of 1937. Inareolata punctoria Roman was important in the Malden area, with a recorded average parasitization of 12.7 percent and a maximum of 32.6 percent; in the Taunton area with a maximum of 10.7 percent; and in the East Hartford area with an average of 8.3 percent and a maximum of 28.3 percent. During 1938 the parasite increased in the Malden area and especially in the East Hartford area. I. punctoria was found over an area of only 15 square miles in the fall of 1937 at East Hartford, as compared to over 56 square miles in 1938. In the East Hartford section this parasite has constantly increased in distribution and parasitization of the borer since the parasite was first released here in 1934. Macrocentrus gifuensis Ashm. has increased spectacularly in range and parasitization in the Taunton, Mass., area. Its parasitization of the borer increased from a recorded average of 1.0 percent in the fall of 1937, to average 8.0 percent with a maximum of 56.3 percent recorded in the fall of 1938. The parasite had attacked over 20 percent of the corn borer larvae in numerous fields where collections were made in the fall of 1938. Since this polyembryonic species produces an average of over 20 adults per parasitized host, it was expected that many more parasite than host adults would be present in such fields of high parasitization this spring. This parasite was recovered at Burlington, N. J., where it was first released in 1938. The known area

occupied by Chelonus annulipes Wesm. in the locality of Taunton was considerably increased, as shown by the 1938 fall survey. The parasite apparently had not increased its rate of parasitization there during 1938. C. annulipes was recovered in Burlington, N. J., following its release the same season but was not recovered at Lee, Va., from releases made in 1936 and 1937. Cremastus flavoorbitalis (Cameron) continues maintenance in the Taunton area but remains of no importance there. The native parasites, Bassus agilis Cress., Labrorychus prismaticus Nort., Macrocentrus robustus Mues., and Amblyteles brevicinctus (Say) were all recovered in the course of the 1938 fall survey but, as in past years, were found to be of little importance in control of the corn borer. The biotic resistance to the corn borer as a result of the introduction of exotic parasites has continued to increase in the Eastern States area. This is believed to have reached important proportions in the Malden and Taunton, Mass., East Hartford, Conn., and Lee, Va., areas. Parasitization is still increasing in most of these areas and establishment of some of the most promising exotic parasites in new localities is recorded for the first time following more recent releases.

Control of the entomogenous fungus Beauveria bassiana, infecting European corn borer larvae in the laboratory.--W. G. Bradley and D. D. Questel, Toledo, Ohio, report as follows on results of their observations to control infections of the entomogenous fungus Beauveria bassiana in full-grown European corn borer larvae being carried in the laboratory for parasite emergence and as a source of moths for various laboratory rearing programs: Phenylmercuric nitrate was tested at various dilutions in distilled water on disease cultures on potato-dextrose-agar media and on inoculated corn borer larvae when subjected to various conditions of exposure and development. Concentrations of the test solutions as high as 1-48,000 produced a toxic effect on mature corn borer larvae. Satisfactory control of the disease organism on culture media was not obtained with dilutions of the antiseptic of 1-192,000 or higher. An aqueous solution of phenylmercuric nitrate (basic) used at the dilution 1-96,000 appeared to be the most satisfactory antiseptic for controlling B. bassiana, with a minimum of toxicity to the treated larvae. Single spores in contact with the fungicide are killed by dilutions of 1-96,000, but conidia in masses or undisturbed from their globose conidiophores are difficult to wet and under such circumstances complete control is not certain. Phenylmercuric nitrate (1-96,000) is ineffective unless applied to the larvae within 24 hours following inoculation. Control of B. bassiana among larvae isolated in 2-inch vials appears practical by utilizing phenylmercuric nitrate (1-96,000) as a substitute for tap water for at least some of the necessary contact-moisture applications.

White grubs late in leaving hibernation quarters in southern Wisconsin.--T. R. Chamberlin, Lee Seaton, and J. A. Callenbach, Madison, Wis., report that digging in pastures in southern Wisconsin during the last 10 days in April indicated that practically all of the grubs were below the 10-inch level in the soil and that most of them were near the 15-inch level. Since 15 inches is approximately the depth at which most of the grubs have hibernated during the last few seasons, there has been apparently little upward movement thus far this season. As was expected, all grubs from the 1938 oviposition were of the second instar, the molting period for this stage

normally beginning about the middle of June. A great deal of plowing was done at intervals during the last 2 weeks of April and it is doubtful if any of this has had any material effect upon the grub populations. At the end of the month an entirely different situation was observed in a lawn in Madison. This lawn was heavily infested with third-instar grubs, which were active and in the sod. Third-instar grubs at this time of the year ordinarily would be from beetles flying 2 years previously, in this case in 1937. Third-instar grubs occasionally have been observed to come to the upper levels of the soil in their third season and to feed for some time, but in this case the grubs resembled third instar in the second season rather than the third and the species concerned was for the most part Phyllophaga rugosa (Melsh.), which was very scarce in the 1937 flight. It seems possible, therefore, with a long feeding season in 1938 and an abundance of food in the lawn, that these grubs may have come from the 1938 oviposition and changed to third instar in the fall. The absence of second-instar grubs, the ones to be expected in greatest numbers, adds weight to this inference. An abundance of food for the grubs and opportunity for them to feed continuously seem to be among the most important conditions that have enabled us to rear in the laboratory beetles with a 3-year cycle in about 9 months' time. It does not seem unreasonable to suppose, therefore, that in longer feeding seasons with an abundance of food the life cycle may be accelerated in the field.

JAPANESE BEETLE CONTROL

Nursery shipping season ends in New England.--With the arrival of Memorial Day, the greater part of the spring nursery-inspection work was completed in the New England area. Only 1 of the 13 temporary inspectors employed in this work was retained after May 31. Throughout the area there were more shipments and a larger quantity of plants presented for inspection and certification than for several years. The hurricane of September 21, 1938, also caused an increased demand for stock for replacements, both inside and outside the gypsy moth infested area. At a forest nursery in western Maine it was necessary to make actual tree-by-tree inspection of 2,119,894 trees, consisting of 1,320,924 young evergreens, 798,405 seedlings, 480 shrubs, and 85 young deciduous trees. To cover these shipments 6,067 certificates were issued. This same nursery in 1938 presented for inspection a total of 989,645 trees. In western Maine the frost held in the ground until April 26, making it necessary to inspect over 2 million trees within a period of about 2 weeks at 1 establishment. In order to provide room for inspection, old railroad boxcars were used. These were on a spur track next to the packing house and were lighted by electricity. As fast as the trees were dug in the field they were delivered to these cars, inspected for gypsy moth egg clusters, and then transferred to the packing house. During 1 period an inspection crew of 12 men worked in 8-hour shifts for several consecutive days. Only 2 gypsy moth egg clusters were found in the entire lot of trees examined.

Brown-tail moth and tent caterpillar activity.--Brown-tail moth larvae were first noted emerging from their winter webs at Raymond, Maine, on May 10. Webbing of tent caterpillars in the New England area was first observed by district inspectors on April 25 in the Westfield, Mass., district. Other observations of the webbing of this species were made by districts as follows: Middletown, Conn., May 1; Concord, N. H., May 5; Westerly, R. I.,

and Barre, Vt., May 8; and Bangor, Maine, May 15. In 1938, tent caterpillar webbing was reported as early as April 14 in Massachusetts and April 18 in both Vermont and Maine.

Gypsy moth hatching dates.--Earliest observations of hatching of gypsy moth egg clusters were made in the town of Granville, Mass., on May 3. The first hatching in Rhode Island was recorded in the town of South Kingston on May 8. Fewer observations were made in Connecticut, where the first larvae were noted in the town of Killingly on May 11. On the latter date hatching also began in the town of Keene, N. H. Not until May 13 were newly hatched larvae seen in Maine. These were observed in the town of Fryeburg.

Dutch elm disease culture laboratory moved to Bloomfield.--The culture laboratory for Dutch elm disease and the apparatus required for culturing were removed from the Morristown, N. J., laboratory to especially constructed laboratory quarters at the Bloomfield, N. J., divisional field headquarters on May 8. Most of the necessary equipment was installed and in operating condition by that date. The culture laboratory will be maintained as a separate unit of the Division and not as a part of the New Jersey project work office. Four appointed men were transferred from Morristown to Bloomfield on May 15, and on the same date several security-wage workers were assigned as laboratory assistants, clerks, and laborers. The first media were poured into petri dishes at the new laboratory on May 16 and culturing was started on May 17. About 1,800 twig samples were accumulated for culturing during the 2 weeks required to transfer the laboratory equipment and set it up in Bloomfield.

Early elm-wilting symptoms.--The first definite signs of elm-foliage wilt, characteristic of Dutch elm disease infection, were observed on May 16 on a small elm being eradicated in the town of Greenwich, Conn. In Dutchess County, N. Y., during the same week another instance of early season wilt was reported, this being in a tree that was tagged in 1938. On May 26, two area foremen observed characteristic wilting on a tree located in Hillsborough Township, Somerset County, N. J., near the Sourland Mountains. Wilting was also observed late in the month on an elm tree located in Crugers Park, Putnam County, N. Y. It was a definite green wilt but did not show discoloration below the bark. The tree was not sampled but was left for further observation.

First-record Dutch elm disease infection.--In mid-May laboratory culturing of twig samples confirmed the presence of the Dutch elm disease fungus in an elm located in Buckingham Township, Bucks County, Pa. This township adjoins the townships of Wrightstown and Upper Makefield, where infections have been previously found. With Buckingham Township coming within the infected area, the boundary connecting the outermost points of infection moves west to Neshaniny Creek. This township adds 34.1 square miles to the infected zone, increasing the total square mileage in the State to 171.6; however, there are only 31 known cases of infection in this area.

Burning of elm logs banned in Connecticut.--During the second week in May the Connecticut State fire warden placed a ban on all ordinary burning, causing a considerable accumulation of wood piles. All field men were

required to work on rainy days for the purpose of burning as many of these accumulated piles as possible. This ban was occasioned by the lack of rainfall during the month and the great fire hazard from the thousands of trees felled by the September hurricane.

Eln sanitation completed in swamp area.--By May 20, eln-sanitation work was completed in a large swamp in Patterson Township, Putnam County, N. Y. Over 10,000 elms of all sizes were removed from this 1,500-acre swamp. All elms within a 500-foot radius of an infected tree in the south end of the swamp were pruned. This work was performed by men who were being trained in tree climbing for later assignment as scouts for beetle-infested elms.

Eln-foliage development delayed.--Throughout the New York work area elm leaves did not appear on the trees until the first of May. Small leaves had appeared on most of the elms by May 6. Elm leaves were fully two-thirds grown by May 7, 1938.

Spring soil treatments at isolated Japanese beetle infestations.--In May 57.3 acres was treated in cities in Illinois, Indiana, North Carolina, and Ohio. In Chicago, 9.6 acres was treated between May 22 and 31. The Chicago treatment is being continued into June. In Indianapolis, 7 acres was treated from May 25 to 31, also carrying over into June. In Conneaut, Ohio, where soil spraying was started on April 22, treatment of 7 acres was concluded on May 2. At Ashtabula, Ohio, 8.4 acres was sprayed between May 3 and 11. Soil treatment in East Spencer, N. C., started on April 21, was completed on May 5, with a total of 21.4 acres covered. Between April 25 and May 4, 7.2 acres was treated in Durham, N. C. In Raleigh, N. C., treating started on April 29 was finished on May 6 for a total of 8 acres sprayed, and 10 acres was treated at High Point, N. C., between May 1 and 6. All of these treatments were in cooperation with the States or cities infested.

Methyl bromide fumigation begun in Pennsylvania.--On May 1 a nurseryman at Strafford, Pa., completed the first fumigation chamber to be used in the State. Since that date 3,145 potted plants have been fumigated and certified for shipment from the infested area. These plants, valued at \$1,500, would not have been certified under previous fumigation requirements. A further demonstration of methyl bromide fumigation was held at a large greenhouse establishment at Norwood, Pa., on May 3. This was well attended by nearby nurserymen and florists, who brought nursery, perennial, and greenhouse stock for fumigation. This stock was returned to the respective owners for observation. A similar demonstration was also staged at Bloomsburg, in central Pennsylvania, on May 23. The Pennsylvania Nurserymen's Association has requested that a demonstration be arranged for their annual summer picnic to be held at State College.

Eighty thousand traps to be used in Maryland Japanese beetle retardation campaign.--Plans for the second season of the large-scale retardation program sponsored by the Maryland authorities call for the use of 80,000 traps instead of the approximately 40,000 used last summer. An adaptation of the standard Japanese beetle trap has been developed by George S. Langford, who believes that the larger trap will prove more

efficient in their campaign, much of which is done in cooperation with individual farmers who set and tend the traps in their own fields.

Early Japanese beetle emergence.--The earliest report of Japanese beetle emergence came from Strafford, Pa., where a single adult was collected from a buttercup growing near the south side of a building. Traps set in the Norfolk, Va., area to indicate emergence caught one beetle on May 29.

FOREST INSECT INVESTIGATIONS

Pine beetle damage in Oregon and Washington.--According to F. P. Keen, a report has just been issued by the Portland forest-insect laboratory summarizing the results of bark-beetle surveys conducted in the ponderosa pine forests of Oregon and Washington during the last 5 years. This report shows that beetles have killed an average of 830,000,000 board feet of ponderosa pine saw timber in Oregon and Washington each year during the period 1931 to 1937, inclusive. This is 70 percent as much as the total saw timber cut by all the pine sawmills operating in the region and nearly 28 times as much timber as was killed by forest fires in the pine region during the same period. The total value of this loss is estimated at over \$2,000,000 a year, while an average of \$92,410 a year has been spent by Federal, State, and private timber agencies in control work.

Mountain pine beetle likes large trees.--The mountain pine beetle not only appears to select the larger western white pine trees for attack but also produces more abundant broods in them, according to W. D. Bedard, of the Coeur d'Alene, Idaho, laboratory. The following tabulation, resulting from 295 trees examined during the last 3 years, shows the average number of attacks and mountain pine beetle brood in trees within various diameter classes.

Diameter (inches)	Average per square foot	
	Attacks	Brood
	Number	Number
6-10-----	5.3	4.3
11-12-----	5.2	17.5
13-18-----	5.2	19.9
19-24-----	6.1	22.8
25 or more---	5.1	26.1

It is obvious that trees under 10 inches in diameter produce insufficient brood to be of importance and need not be considered in control work. It is also apparent that the larger the tree the more abundant are the broods produced and, as the larger trees contain more infested bark surface, they are the most important trees from the standpoint of control.

Budworm outbreak on Douglas fir in Colorado.--A widespread increase in the infestation of the spruce budworm strain attacking Douglas fir is reported by Donald De Leon, Fort Collins, Colo. Last year the infestation

occurred only in isolated patches in the stands of Douglas fir in the canyons leading out from Estes Park and other nearby canyons. This year the infestation has spread so that the patches are now united and very severe defoliation is expected. Considerable defoliation of the new growth has already taken place. In the defoliated stands it is probable that parasites and climatic conditions will control the outbreak before a great deal of damage is done.

Paper birch in northern Wisconsin defoliated by weevil.--H. J. MacAloney, Milwaukee, Wis., reports that adults of a small weevil, Orchestes alni var. pubescens Steph., are so numerous in stands of sapling and pole-size birch on the Chequamegon National Forest in northern Wisconsin that hundreds can be jarred from a single tree. The shot-hole feeding was sufficiently heavy on May 29 to make foliage noticeably thin, and it is probable that almost complete defoliation will result in some stands before feeding ceases. This insect has been present in northern Wisconsin for several years, and it appears that successive defoliations have so weakened the trees that they are now subject to attack by the bronze birch borer.

Hemlock borer active early in Wisconsin.--On May 17 H. C. Secrest, Milwaukee, found the hemlock borer in all stages of development, from second-instar larvae to adults. In log decks pupae and adults were found in the bark of that portion of the logs which was exposed to the sun. Emergence from these logs was first noticed on May 22. On May 24, 2 adults which had apparently emerged from standing trees in an exposed part of the forest were also found, and by May 29 the beetles were numerous. By means of a potentiometer, temperatures of the upper and lower surfaces of logs in an exposed deck were obtained, and a correlation between temperature and development of the borers was evident. On May 31 no beetle emergence had taken place from the lower third of the log surface, only 5 had emerged from the sides, and 52 beetles and 22 parasites had emerged from the upper surface of the exposed logs. The difference in temperatures at the bark surface of the upper and lower surfaces of exposed logs showed a variation of 52° F. No emergence had occurred on May 31 from a log deck which had been under shade in a fairly dense stand.

Notes on an introduced pine sawfly.--C. L. Griswold, Morristown, N. J., who is making observations on some of the introduced sawflies that feed on pine, has found that the larvae of Neodiprion sertifer Geoff. sometimes sever, or partially sever, the young pine shoots and feed on the bark of the growth of the preceding 2 years. Instances of such injury were noted during May in certain areas where the larvae were abundant. Because of the presence of this sawfly, over 100 acres of planted pine on estates in northern Somerset County, N. J., were sprayed this spring with an arsenical mixture applied with an autogiro.

Hickory bark beetle found in elm trees.--Adults of the hickory bark beetle (Scolytus quadrispinosus Say) have sometimes been taken from the surface of felled elm trees in New Jersey. In 1937 W. D. Buchanan, of the Morristown, N. J., laboratory, reared adults from elm logs with which beetles had previously been confined. In February 1939 the Dutch elm disease eradication unit submitted a piece of elm containing galleries of this species from Fall Creek Township, Hamilton County, Ind. This is

the first record that the laboratory has of S. quadrispinosus breeding in elm in the field.

Forest tent caterpillar decreases in parts of New England.---J. V. Schaffner, Jr., New Haven, Conn., reports that observations early in May on the forest tent caterpillar in various localities in Vermont and one locality in western Massachusetts, where feeding has been heavy during the last 3 or 4 years, indicates that the infestation is at present, on an average, some 50 percent less than a year ago. In the city of Barre, Vt., many shade trees were found to be heavily infested, and spraying was advised. In other localities examined, although egg clusters and small larvae were very common, it seems improbable that serious defoliation will result from the feeding by this species in 1939. General hatching occurred throughout this region about the end of the first week in May, probably about 2 weeks later than normal.

Pine plantation in Massachusetts heavily infested with weevils.---A severe infestation of a little-known weevil, Hylobius radicis Buchanan, was reported in a plantation of Scotch, Corsican, and white pines on a watershed at Weston, Mass. An investigation by J. V. Schaffner, Jr., disclosed that this plantation was originally planted in 1926 and that replacements have been made from time to time. In the hurricane of September 1938 approximately 50 percent of the trees were uprooted or broken off at the base and most of these were found to be infested by this insect, which works under the bark at the tree base. Counts in three sample plots showed that approximately 82.5 percent of the Scotch and Corsican pine was infested in this 5-acre plantation. A few red pines along the edge of a bordering plantation were also found to be infested.

Hurricane-thrown white pine timber lightly infested.---Mr. Schaffner visited several dry storage sites in Massachusetts and southern New Hampshire and examined white pine logs and round-edged lumber on May 23 and 24. Five species of bark beetles were found beneath the bark of white pine logs and have been tentatively determined as Dendroctonus valens Lec., Hylastes porculus Lec., Hylurgops pinifex Fitch, Ips pini Say, and Pityogenes hopkinsi Sw. No cerambycid or ambrosia beetles were found. Considerably less than 1 percent of the logs were attacked, and these were only lightly infested.

European spruce sawfly plots established in Northeast.---P. B. Dowden and W. F. Sellers, New Haven, Conn., report that during April and May 9 permanent sample plots were established for a detailed study of Diprion polytomum. Plots were laid out in the following townships: Orange, Conn.; Westfield, Mass.; Dublin, N. H.; Pharsalia, N. Y.; Marlboro, Vt.; Woodford, Vt.; Township 30, Maine; Township 12, Range 16, Maine; and Township 11, Range 15, Maine. Each plot consists of 4 acres and contains 100 numbered trees, with the exception of the 1 plot located in Township 11, Range 15, Maine, which is 2 acres in extent. At the side of each numbered tree a stake has been set and a square-foot sample of duff removed and brought to New Haven for the purpose of analyzing the sawfly cocoons present. Results of these analyses will be reported later. Weather-recording instruments have been placed at each plot with the exception of Orange, Conn., Pharsalia, N. Y., and Township 11, Range 15, Maine. Records for Orange,

Conn., will be obtained from New Haven; those for Pharsalia, N. Y., from the Forest Service station at Chenango, and it is believed that Township 11, Range 15, Maine, is near enough to Township 12, Range 16, Maine (5 miles) for 1 set of instruments to serve both plots. It is planned to establish 2 more permanent plots during the summer, making a total of 11.

Cost of spraying for white pine weevil.---The cost of spraying white pines with concentrated spray mixtures in 1938 and 1939 averaged approximately \$2.75 per acre, which includes the total cost of insecticide, equipment, and labor. S. F. Potts, New Haven, who conducted these experiments, believes that it is possible to materially reduce this figure by improving the apparatus used for applying the concentrates.

Rate of reinfestation by European pine shoot moth in control plots.---Mr. Potts also reports that a partial survey of plots sprayed during the last 2 or 3 years indicates that where nearly complete kill was obtained very little reinfestation has resulted and the trees have recovered rapidly. Where 75-percent kill (or less) was obtained the infestation 2 years after treatment was about equal to that in the untreated check area. Experiments indicate that two applications of concentrated spray, with an interval of 3 or 4 years between applications, should be sufficient to protect all susceptible pines, with the exception of mugho pine, during the entire life of the tree. Few trees under 6 years or over 14 years of age are seriously attacked.

Observations on infestations of Matsucoccus gallicolus in New England.---On May 5 it was noted by T. J. Parr, New Haven, that egg masses of *M. gallicolus* had started to hatch at Plainville, Conn. This was before the new growth was well started and indicates that there may be a decrease in the population of the insect in the Plainville infestation this year, owing to lack of new growth when the first nymphs emerged. Material from Kent, Conn., showed that the eggs did not hatch as soon as at Plainville, and the new growth is now well covered with feeding nymphs. Examination of the Cape Cod, Mass., and southern Rhode Island infestation areas on May 25 and 26 showed the infestations which were heaviest on Cape Cod in 1937 to have been reduced somewhat, indicating that the twigs which were most heavily infested died early enough in the summer to cause the death of the insects present. The insect is, however, more widespread in its distribution on Cape Cod than it was in 1937. The salt-water spray, which drenched infested trees along the shore in southern Rhode Island during the hurricane of last September, did not affect the egg masses under the bark scales, and these eggs have now hatched.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Slow foliage development may retard spraying.---Tree foliage has developed so slowly this year that it appeared doubtful by the middle of May that the woodland growth on high elevations in Vermont, Massachusetts, and Pennsylvania would be sufficiently grown to warrant spraying by June 1. Buds on white oak were just beginning to open in some of the more exposed localities, but in more sheltered areas the leaves were approximately from one-fourth to one-third normal size. By the end of the last week in May most of the foliage was about half grown over most of the area. In certain sheltered pockets and in towns and villages foliage conditions were

more favorable for spraying, especially in the Pennsylvania section. The cold days and frosty nights also retarded the development of the foliage on the higher elevations in northwestern Connecticut, where much of the spraying in that State will be done.

Dry forest conditions force rigorous ban on smoking and fires.---A serious fire hazard existed during May throughout the region in which gypsy moth work is conducted, as there has been little or no rainfall since the latter part of April. The dry forest conditions made it necessary to prohibit smoking or the building of fires in the woods for any purpose whatever by gypsy moth workers. The one exception to these regulations was an area in Bear Creek Township in Pennsylvania, which is completely surrounded by water and where the burning of slash and forest debris was permitted during this period. The machine developed by this activity for reducing to sawdust brush and other materials that accumulate during selective thinning operations was used advantageously at sites of gypsy moth infestations in Massachusetts where burlap bands will be applied to the trees this season.

Gypsy moth eggs hatch later than usual.---First hatching of gypsy moth eggs was observed in the field on May 8, which is several weeks later than the first hatching noted last year, and is at least 1 week later than normal. Hatching was general in Massachusetts by the middle of May, and the young caterpillars had crawled away from the egg clusters in search of food. Scouting work was necessarily discontinued at this time and some of the workers were detailed to other work.

Cold weather aids nurserymen in World's Fair planting.---The unusually cold spring, which has delayed foliage development to a marked degree, is prolonging the planting season well beyond the time when such activities normally must cease. However, it is reported by gypsy moth supervisory employees that nurserymen on Long Island, N. Y., welcome this condition, as it permits them to complete the final plantings at the World's Fair grounds. This work is done entirely at night, being started after the fair grounds have been closed to the public, and each night's work is completed before opening time the next morning. In this way, conflict with the various activities and exhibits of the fair is avoided. A large percentage of the trees and shrubs transplanted on the World's Fair grounds originates in the section of Nassau County regulated on account of the gypsy moth, and it must be carefully inspected before removal. This is particularly true on the grounds surrounding the Firestone Building, where wild trees and shrubs native to Long Island are planted. There was a marked decrease in the volume of nursery stock offered for inspection in the Long Island quarantined area during the last week in May.

Arrangements for general gypsy moth spraying completed in Pennsylvania and spraying in residential areas begun.---No gypsy moth field work was scheduled for the Pennsylvania area during the second week in May, as it seemed desirable to arrange the schedule in that State so that the entire force would be available for laying hose lines, erecting barbwire fences around areas to be sprayed, and for spraying later in the month. During the following week the men selected as temporary spray-pump operators were assembled at the gypsy moth storage point in Moosic and were given careful instructions relative to the operation and care of the spraying machines

to which they were to be assigned. The task of obtaining spraying permits in the residential areas was completed, and all other necessary arrangements were made so that spraying could be started without delay. Up to May 20, approximately 100,000 burlap bands had been applied in the Pennsylvania area, and the required number of workers had been detailed to patrol them at regular intervals to kill the gypsy moth caterpillars. It is not necessary to erect as much fencing around areas to be sprayed as has been the case in the past, as a large part of the territory to be treated this season is situated in heavily wooded mountainous areas where there is little or no grazing. However, this saving in time and labor is offset by the necessity of putting abandoned roads and trails in condition so that spraying equipment can be moved over them to water set-ups reasonably near the areas to be sprayed. City spraying in the Pennsylvania area was started on May 22, with 14 spraying machines operating in pairs. One machine of each pair applied the spray and the other followed with water to wash the spray residue from buildings, walks, fences, and garden furniture. Weather conditions were satisfactory for this type of spraying work, as the spray dried rapidly and there was little movement of air to carry the spray material into gardens and against buildings. If favorable conditions continue, all sprayers in Pennsylvania will be operating by June 1.

Water company continues to cooperate in gypsy moth spraying operations.--Each year since the gypsy moth was discovered in the Pennsylvania area the Spring Brook Water Company has furnished water from their service lines for use in spraying the infested residential areas in that State, without cost to the Federal Government or to the State of Pennsylvania. The only stipulation has been that the hydrants be opened and closed by experienced men selected by the water company.

Gypsy moth caterpillars emerge later than usual.--The first emergence of gypsy moth caterpillars noted by C. C. C. foremen in Massachusetts and Connecticut occurred on May 8, and hatching was quite general on the following day. The larvae emerged this season a week or more later than normal, and much later than last year, when hatching occurred during the latter part of April, and the percentage of emergence was high. One hundred and twenty-eight gypsy moth egg clusters collected in 22 towns showed approximately 80-percent emergence, whereas 115 egg clusters collected in 12 towns last year gave a 76-percent hatch.

C. C. C. gypsy moth work in Connecticut.--The usual gypsy moth scouting, creosoting, and selective thinning work was carried on in Connecticut by C. C. C. enrollees during May. In addition, a considerable amount of time was used in preparing areas in the heavily infested Granby-Simsbury-Canton territory for spraying. This work involved the repairing of roads, preparing sites for sprayer-truck set-ups, and erecting and strengthening barbwire fences around areas to be sprayed. Spraying operations were started at this infestation on May 25, with the men working on a double-shift basis. It was not possible to operate all of the sprayers at the same time during the early stages of the work, because of the lack of sufficient spray hose. Some of the machines required hose lines more than 5,000 feet long, and these lines were made by taking hose from the other sprayers. As the more distant points are sprayed and the hose lines are shortened, the extra hose becomes available for the other sprayers, which can spray as much territory as can be reached with short hose lines and gradually lengthen them.

Three organizations cooperate in gypsy moth spraying in Connecticut.--Spraying work at the extremely heavy gypsy moth infestation in the Granby-Sinsbury-Canton area in Connecticut was made possible through the cooperation of 3 organizations. The Federal Bureau of Entomology and Plant Quarantine is supplying 3 sprayer machines, 9,000 feet of high-pressure hose, and 3 supervisory employees. The State of Connecticut Entomologist's Office is furnishing 2 sprayer machines, about 6,000 feet of high-pressure hose, more than one-third of the lead arsenate and fish oil that will be needed, 10 experienced sprayer-truck operators, 10 nozzlemen, 1 mechanic, and a State truck for the distribution of gasoline and oil to the spraying units. Both the Bureau of Entomology and Plant Quarantine and the State of Connecticut Entomologist's Office are supervising the work. The C. C. C. is providing 150 enrollees; 10 gypsy moth foremen, 3 of whom were temporarily transferred from camps where no spraying work is to be done; and the remainder of the lead arsenate and fish oil required. Without the cooperation of these 3 organizations the spraying of this important area could not be done this season.

PLANT DISEASE CONTROL

Rust observations in Mexico.--E. C. Stakman, in charge of rust surveys for the Division, reports that observations made in southern Mexico in April indicate that rust development was sporadic, heavy rust infection being restricted to early sown fields. At that time there was no evidence that infection had spread from these occasional fields in which rust survived the winter and developed abundantly in the spring. As races 38 and 59, on the basis of identifications made so far, appear to be prevalent, as in the past, it is unlikely that spores were blown from southern Mexico into northern Mexico. Obviously, the uredial stage of stem rust persisted throughout the winter in occasional fields in northern Mexico, particularly near Saltillo and in at least one field south of Monterey. Rust was again absent, or almost entirely absent, from the Laguna area near San Pedro and Tlaxiaco. On June 3 the rust situation in Texas and Oklahoma was reported as follows: Wheat was harvested in the San Antonio territory of Texas with very little, if any, damage from rust. Farther north in Texas there was more rust and in Bosque County, for example, it was estimated that three-fourths of the wheatfields had an average stem rust severity of 25 percent and the same was true of about one-fourth of the fields in Dallas, Denton, and Collin Counties. No appreciable damage from stem rust was expected in Texas this year. By May 26, a trace of stem rust was present as far north as northern Oklahoma, where wheat was mostly in the hard-dough stage, or ripe.

Aecial infection on barberries.--By June 3, aecial infection on barberries had been reported from 10 States. On May 24, rust was observed to spread from infected barberries to bluegrass in Pike County, Ill., where aecial infection was more abundant than usual this spring. Barberry bushes were reported rusting heavily in Michigan and about the normal amount of aecial infection had been found in Minnesota. Physiologic race identifications are now under way. Six identifications have been made of the material collected in southern Mexico. These include races 38 and 59. Races 17, 38, 56, 19, and 139 have been identified from collections made in northern Mexico. To date 100 aecial collections have been received and inoculations have already been made from 42 of them.

Resurvey work in northern Wisconsin.--The original survey of the counties in northern Wisconsin was completed in 1924. Comparatively few rural locations were found and very little work has been done in that part of the State since that time. A small crew of men began work in Eau Claire County in April and all old rural locations have been checked. The men are now working in the city of Eau Claire and about two-thirds of the city has been inspected. The results of the work thus far completed show that barberries were found on only 2 of the 7 old rural locations and only 4 new properties were found having bushes. A total of 41 bushes was destroyed on these 6 properties. Of the 71 old locations checked in the city of Eau Claire, only 3 had bushes, but 28 new properties were found with bushes. To date, 131 barberry bushes have been destroyed on these 31 properties.

Several newly infected counties reported in May.--Infection on white pine was found in Tucker County, W. Va., at Horseshoe Public Camp on the Monongahela National Forest. A specimen showed a canker about 1 foot long with aecia, pycnia, and orange-yellow discoloration. This is the first time infection has been found on white pine in this county, although Ribes infection was discovered in 1931 by Messrs. Hodgkins and Geiser. R. G. Pierce reports finding infection for the first time in Hardy County, W. Va., on a small white pine in pycnial stage on Trout Run. Ribes infection in Hardy County was reported for the first time in 1938. Winona County, Minn., has been added to the list of counties where infection on white pine has been found. An infection area of 30 acres in extent, of which 35 percent of the trees possess fruiting cankers, was found near the Winona-Fillmore County line. These counties are close to the northeastern corner of Iowa and may be responsible for the rust in that part of Iowa reported in other years. Infection in Carroll County, Ohio, has been reported for the first time, the disease being found in a 3-acre white pine planting. One tree located about 15 feet from the edge of the woods has 10 fruiting cankers. The infection apparently has spread from a clump of Ribes at the edge of the woods.

Ribes alpinum in vicinity of Madison, Wis., mostly staminate plants.--Staminate plants of R. alpinum have been found by pathologists to be immune to blister rust infection and the pistillate plants susceptible to this disease. This plant is used to some extent as an ornamental shrub in the Lake States region and recently State leader T. F. Kouba examined 400 R. alpinum plants in the vicinity of Madison to determine whether they were male or female plants. All except 5 were male plants and immune to blister rust. Staminate plants blossom much more profusely than the pistillate plants and for this reason apparently have been much more generally used for propagation by cuttings and for ornamental planting than have the pistillate plants.

Control operations started in Northwestern region.--On May 1, the field season in the Northwestern region was started, as operations supervisors moved equipment, supplies, and a few men into camp locations. Within 2 weeks most of the Bureau camps had been established and about 400 men were at work. Forest Service C. C. C. and W. P. A. camps were also started at this time. Because of an unusual period of warm, dry weather in April and the first half of May, conditions are exceptionally favorable for Ribes eradication. Early in June the Bureau's labor personnel in Idaho and Washington exceeded 1,100 men in 16 camps.

Incipient cankers indicate heavy 1937 pine infection in Idaho.---The appearance in May of a relatively large number of incipient cankers on the first unprotected, heavily infected areas surveyed this year indicates that 1937 was favorable for infection of white pine, reports R. L. MacLeod, in charge of disease surveys in the Northwest. These range from pea-sized spots to discolorations $\frac{1}{2}$ inch long, appearing on growths of the years 1937 through 1933. The year 1937 was marked by more than twice normal rainfall in both April and June but extremely light precipitation from July through October.

Dormant-season eradication of Ribes in Maryland.---A study was made in Maryland to determine the comparative efficiency of initial Ribes eradication during the spring, summer, and dormant season on skunk currants (R. prostratum) and the gooseberries R. rotundifolium and R. cynosbati. Some of these plots were initially worked during the dormant season, others during the summer, and the third group during the spring when the leaves first appeared on the Ribes. All of the plots were reworked during the first spring following the initial eradication. It was found that, in the case of eradication during the dormant season, approximately 83 percent of the total Ribes destroyed were found during the winter coverage, and the other 17 percent were dug out during the "mop-up" operations the following spring. In the case of spring and summer work, over 95 percent of the total Ribes destroyed could be located the first time over the ground, leaving only 5 percent for removal the following spring. More than 90 percent of the live stem was destroyed during the dormant season's work, and over 97 percent of the live stem was destroyed during the spring and summer operations. The Ribes were heavily concentrated on all the plots and in no case was the live stem reduced to a reasonably safe figure by dormant-season eradication. Despite the fact that a large percentage of Ribes and live stem was destroyed on initial work, it was found that on gooseberries and skunk currants over 100 and 270 feet of live stem, respectively, was left after the dormant-season working. The study showed that in heavy Ribes concentration when the ground is not frozen it may be practicable to do dormant-season eradication, but that a finished job cannot be expected under these conditions.

Observations of blister rust damage in eastern British Columbia.---During the second week in May, E. L. Joy, of the Northwestern regional office, accompanied Forest Service officials of Region 1 on a trip to several of the oldest infection centers in the area from Nelson to Revelstoke, British Columbia. The visit was made possible through the courtesy of Canadian forestry officials. These areas were of particular interest to the party since they had been the object of inspection by three of the group in 1932. In the intervening 7 years the rust had spread into all white pine areas along the route of travel, a condition that possibly exists throughout all of the white pine stands in the eastern part of the Province. Around the oldest centers damage and kill are very severe, running as high as 95 percent of the stand. In fact, the members of the party concluded that the complete elimination of white pine from such areas is certain. It is of considerable interest though that this is not readily noted unless inspection is made within the stand, for many dead and dying trees are already screened from view by other growth, such as willow, birch, and the coniferous associates of white pine. In the pole- and mature-size trees, broken tops and "flags" are the most noticeable form of

damage. At several locations it was noted that there is a relative scarcity of pine infection originating in the last few years. Since most of the infection in this region originated on Ribes nigrum and wild Ribes are very scarce, it seems possible that rust damage to the black currant bushes may have caused their removal from some of the farms. Although no survey of this was made, several known patches of black currants were noticeably missing this year.

Phenological data in the Northeast.--Reports from Maine indicate that Ribes were well leafed out by May 20, although other vegetation was very backward, making ideal eradication conditions. The aecial stage of the rust was developing rapidly by May 13 and spores were flying in the southern towns. In New Hampshire, notwithstanding the continued cold weather, Ribes continued to develop and by May 20 were coming along well enough for identification by the crews, except at points where snow or ice still persisted. Most of the gooseberry species seemed more backward than other members of the Ribes family. In New York foliage had developed to such an extent by May 13 that work was in full progress in the southern part of the State. In Massachusetts, State leader Perry reports that while visiting at Wareham in Plymouth County in the early part of May, he found Ribes, chiefly escaped red currants, in half leaf. Aecia were just opening in infection areas visited. Mr. Perry says that the woodlands in Wareham escaped the hurricane with very little blow-down damage, but practically all the mature timber suffered appreciably from salt spray. Many of the stands are completely defoliated or are becoming so. The buds, however, are apparently unharmed and are now developing so that it will be a question of whether or not the new foliage will be able to carry the trees through this present season. Field conditions from May 6 to 12 were ideal for Ribes-eradication work, as extreme temperatures during the early part of the month served to stimulate foliation of the Ribes but other associated vegetation, especially ferns, had not advanced sufficiently to obscure the Ribes.

Spring opened early in the Northwest.--Owing to a warm, dry period in this region during April, snow melted from the lower and middle elevations early. As a result, Ribes started to leaf out in April, and this continued rapidly in May, because of the continued warm weather. Coincident with the appearance of the leaves was the beginning of heavy production of aecia. General infection of Ribes is taking place as a result of a period of occasional rains that started about the middle of May.

COTTON INSECT INVESTIGATIONS

Characters of cotton plant in relation to boll weevil injury.--In an effort to determine whether some types of cotton were more resistant to the attacks of the boll weevil than others, E. W. Dunnam and J. C. Clark, Stoneville, Miss., studied 12 commercial varieties of cotton over a period of 3 years. Two pure-line varieties (self fertilized for several years) were studied during 1 season for comparison with the commercial types. Two series of bolls, ranging from 12 to 32 days of age in intervals of 4 days, were tested for boll-wall toughness with a "resistometer" that measured in grams per square millimeter the pressure required to puncture the carpel linings. The tests on the first or "early" series of bolls was started when 12-day-old bolls became abundant on the plants, and the second

or late series immediately upon completion of the early series, thus covering the fruiting period when the major portion of the crop was produced. Tests were made both from the outside and inside of the carpels but the results were more reliable when made from the inside or lining side of the carpels. The average resistance to inside puncture over the 3-year period for the early series of bolls was 885 grams per square millimeter and for the late series 950 grams per square millimeter. Statistical analysis showed highly significant differences between certain varieties. The greatest increase in toughness or resistance occurred in all varieties in bolls between the age of 12 and 20 days. In all but 2 varieties the resistance in the early series of bolls progressively increased with age up to 32 days, whereas in the late series the resistance decreased after 24 days of age. The thickness of the boll walls and the diameter of the bolls were measured with calipers at the time the resistance tests were made. The average boll-wall thickness was 2.31 mm. for the early series and 1.88 mm. for the late series of bolls. Bolls of some varieties had significantly thinner walls and offered more resistance to puncture than other varieties with thicker walls. There was a strong negative correlation between the mean boll-wall thickness and mean resistance of carpal lining to punctures. This negative correlation was also observed within individual varieties when seasonal influences caused the boll-wall thickness to increase. Pairs of boll weevils enclosed in muslin bags with bolls caused the greatest damage to lint of varieties with thin boll walls, the next greatest to those with thick walls, and least damage to those with walls intermediate in thickness. Examinations of bolls showed that practically all feeding and egg punctures penetrated the carpal linings and reached the lint of the thin-walled varieties, but many punctures did not penetrate the carpal linings of the thick-walled varieties. In some of the latter bolls the eggs hatched within the boll walls but the larvae were not able to penetrate the lining and after feeding outside the lining for a while perished for lack of suitable food. Nevertheless, such feeding damaged the locks within. A positive correlation existed between the percentage of damaged cotton and resistance to puncture. Therefore, toughness of the lining without the protection of boll-wall thickness is of little value in resisting damage caused by weevil punctures. There appeared significant differences among the varieties with respect to the average number of boll weevil punctures per lock. Statistical analyses showed that there were significant differences among all varieties tested with respect to age of bolls, and among some with respect to early and late series. Over the 3-year period the significance of the variance contributed by the interaction of ages times series ranged from nothing to a very high factor. No significant differences could be established between Arkansas 17 selfed line and the commercial type with respect to resistance to puncture or boll-wall thickness. Neither could significant differences be established between the Half-and-half selfed line and the commercial type with respect to resistance, but there were with respect to boll-wall thickness. There were differences in brilliance loss caused by the boll weevil among the varieties studied, but no statistical differences in the gain of undesirable colors. The loss in staple length of weevil-damaged cotton differed slightly among the varieties, but no significant differences could be established. The average bloom intervals on fruiting branches ranged from 5 to 6 days among the varieties, while the average time required from beginning of square to open bloom ranged from 22 to 25 days. There was a great variation among the varieties in total bloom production, with a difference of 20.6 percent of blooms

produced by August 8. All cottons had a complete rest period before second growth began and the more determinate ones produced 30 percent less second growth blooms during the peak week of October 4 to 10. The percentage of total blooms that produced bolls ranged from 27.3 to 47.4. The percentage of first-growth leaf drop among the varieties ranged from 24.4 to 52.1. The percentage of plants with no lateral branches was 19. The percentage of plants having lateral branches 1 to 6 inches long was 19, and the percentage having lateral branches 7 to 12 inches long was 35. The average terminal bud second growth ranged among the varieties from 2.7 to 7.0 inches.

Effect of cryolite on plant growth.--A preliminary test to determine the effect of synthetic cryolite on the germination and growth of cowpeas was conducted by F. F. Bondy and C. F. Rainwater, of Florence, S. C., this spring. Cryolite was added to a fairly fertile sandy soil, typical of the section, at the rates of 100, 200, 400, 800, and 1,600 pounds per acre. Six-inch pots were filled with the soil and planted to cowpeas under greenhouse conditions. The germination was not affected and the peas in all the treatments grew at approximately the same rate. Cowpeas are very susceptible to injury from arsenic in the soil, but apparently synthetic cryolite is safe to use as an insecticide insofar as soil injury is concerned.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Inspection.--Bloom inspection, which was begun in April in the Brownsville-Matamoros area of the lower Rio Grande Valley of Texas and Mexico, was continued throughout May. Inspections in this area are begun each season when the first cotton blooms appear and are continued throughout the development of the cotton crop, with intensive inspection of trash from cotton during the ginning season. These inspections are made for the purpose of determining the degree of pink bollworm infestation in this area, and thus give a knowledge of results being obtained from the control and eradication program which has been in effect on both sides of the Rio Grande since the discovery of the pink bollworm 3 years ago in this subtropical area lying adjacent to the main Cotton Belt of Texas. The first pink bollworm from the 1939 cotton crop was found in the Brownsville area on May 1. Systematic bloom inspection was begun on May 9 where infestation has been heaviest since its inception, and to the end of May 512,016 blooms had been inspected in the Brownsville area of Cameron County and 797 pink bollworms found. Of this total, 487 specimens came from the A. Leal field and 277 from the Lozano Banco field, the two most heavily infested farms on the American side, and 33 specimens came from 9 miscellaneous fields. A total of 167,072 additional blooms were inspected in Starr, Hidalgo, and Willacy Counties of the lower Rio Grande Valley area with negative results. In the Matamoros area of Mexico, 174,369 cotton blooms were inspected in cooperation with Mexican inspectors during May, and 16 specimens of the pink bollworm were found. As a result of bloom inspection in the Brownsville area, consideration is being given by the State to the purchase of the cotton crop on the two heavily infested fields, after which all fruit capable of sustaining the pink bollworm will be picked off daily to prevent dissemination of the pink bollworm. In the meantime all rosette blooms in the 2 heavily infested fields are being picked daily in an effort to check infestation while condemnation proceedings are being carried on for the purchase of the 2 fields. Arrangements

have been made for a State Compensation Claim Board to be appointed early in June to carry out condemnation proceedings.

Conditions in the Big Bend.--Owing to the late planting date of April 20 being observed on both sides of the Rio Grande in the Big Bend area of Texas and Mexico, and a further delay in many cases because of extremely cold weather during the latter part of April, cotton in that area as a whole is very late, and cool nights up until recently have retarded the growth of plants. A few small squares could be found in the earliest plantings in the Presidio area on May 25, and it is not believed that any squares will be large enough to afford food for the maintenance and propagation of the pink bollworm until the first week in June, and cotton is not expected to begin blooming until around June 25. Therefore, owing to the fact that all dangerous stub cotton has been eliminated from the Presidio and Ojinaga areas on both sides of the Rio Grande, it is believed that pink bollworm moths have been emerging in those areas since about the middle of March and have perished on account of finding no food on which to live and reproduce themselves. This conclusion is based on past experience in the control of the pink bollworm in this area and is substantiated by observations made by the Research Division of the Bureau at Presidio, Tex. Indications are, therefore, that our efforts to reduce the heavy pink bollworm infestation in the Big Bend area are bringing about good results and that we can expect a substantial gain in the program toward control in the 1939 cotton crop.

Pink bollworm eradication in Arizona.--The spring program which was begun in the east end of the Salt River Valley on April 10, and the program for the destruction of stub cotton which might be the means of carrying over the present light infestation of the pink bollworm in Maricopa, Pinal, Pima, and Santa Cruz Counties, were brought to a satisfactory conclusion at the end of May. This control work was begun in the winter of 1938-39, following discovery of reinfestation in the Salt River Valley where it was eradicated during the years 1929-31. This program consisted of the cutting of all 1937-38 cotton stalks, followed by the raking and burning of all plants and debris, a delayed planting date for all cotton, and the elimination of stub or soca cotton from the acreage involved, thus providing a starvation period for emerging pink bollworm moths prior to the fruiting of the 1939 cotton crop. An educational campaign was also begun among farmers early in the year with reference to the destruction of stub cotton, pointing out to growers the very important phase of this work and enlisting their cooperation, and it is felt that outstanding results were accomplished. Much of the credit for the successful accomplishment of the stalk-destruction phase of the program must be given to the Agricultural Adjustment Administration through their timely cooperation in issuing a regulation requiring the destruction of all stub cotton in the affected areas. This regulation was issued by the A. A. A. following its determination that failure to destroy volunteer or stub cotton would constitute a practice which would defeat the purposes of the 1939 Agricultural Conservation program, and that it would also greatly assist the Bureau and State of Arizona in carrying out the control program. Exceptionally fine cooperation was also given voluntarily by many farmers who did not come directly under the jurisdiction of the A. A. A.

Wild-cotton eradication in southern Florida.--Wild-cotton eradication in southern Florida made good progress during May. For a number of years an effort has been under way to eliminate wild cotton from this

section of Florida owing to the fact that it is infested with the pink bollworm, and is thus an ever-present danger of dissemination of the pink bollworm to domestic cotton plantings. Toward the end of the month all areas had been cleaned twice and a third cleaning started. Approximately one-third fewer acres were recleaned over the entire area in May than during April, and approximately 4 times as many plants were destroyed. The increase in the number of plants was due to heavy rains in April. Particular attention was given to recleaning wild cotton colonies in the Bradenton subdistrict and less time given to scouting doubtful areas. Only 15 plants with mature bolls were found and 12 of these were cultivated plants. The third cleaning of the season was completed in Pinellas and Hillsborough Counties. A second cleaning was completed in Manatee County and a third cleaning started. In the Fort Myers subdistrict all areas were cleaned twice and a third cleaning started toward the end of the month. More than twice as many acres were cleaned in this subdistrict in May as in the previous month and approximately 4 times as many plants destroyed. As stated above, the increase in plants was due to heavy rains during the previous month. Only 8 plants with mature bolls were found in the entire subdistrict. The second cleaning of the season was completed in the Ten Thousand Islands section. This concludes the work in that section for this season. During the month 203 plants with mature bolls were found in that area. At one time it was thought that the Ten Thousand Islands section would be one of the most difficult from which to entirely eradicate wild cotton plants but, judging from this season's results, excellent progress is being made toward the eradication of wild cotton in that area. In addition to recleaning known wild cotton colonies, 3 small colonies comprising only three-fourths of an acre, located as a result of the aerial survey, were cleaned for the first time, 114 virgin plants being found and removed. These colonies were on 3 small outlying islands. Twenty such islands in that same vicinity were examined, with wild cotton being found on 3 of them. The second recleaning of the season was in progress over the entire keys subdistrict. There was no appreciable increase in the number of wild cotton plants found per acre, as there has been little rainfall on the keys, except in the Key West area. In the entire Florida district 316 wild cotton plants with mature bolls were found. Of this number 253 plants were found on Key Largo. A few specimens of the pink bollworm were also found on Key Largo.

Thurberia-plant eradication.--Good progress was made during May in the destruction of Thurberia plants in the Santa Cruz Valley of Arizona. This program has been in progress for several years in the various mountain ranges of southern Arizona, through the provision of W. P. A. funds, for the purpose of depriving the Thurberia weevil of a host plant and thus prevent its spread to cultivated cotton plantings. Approximately 19,040 acres was covered during May and 14,517 Thurberia plants destroyed, most of which were heavily infested with the Thurberia weevil. The total number of laborers actually employed on the cotton line during the period was 136, making a total of 2,713 man-days worked. If the requisition already in the hands of the State Administrator for laborers is filled in June, it is anticipated that it will be possible to clean out most of the plants in the larger canyons on the west side of the Tucson-Nogales road and then put crews of men in the larger canyons on the east side, thereby removing the greater number of large plant colonies before the summer rains, which will release weevils from their cells.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Sulfonation of certain vegetable oils increases toxicity to harlequin bug.--Preliminary laboratory tests conducted recently by R. A. Fulton and N. F. Howard, of the Columbus, Ohio, laboratory, have indicated that certain sulfonated vegetable oils were more toxic to the harlequin bug than the natural oils in tests designed to determine their efficiency in combination with rotenone-bearing materials. The oils which were not very toxic to Murgantia histrionica Hahn, before sulfonation and which were more toxic when sulfonated were soybean, coconut, castor, linseed, and corn oil. Toxicity of the following oils, which in general were more toxic in the natural state than those mentioned before and which were not appreciably increased by sulfonation were olive, teaseed, and cottonseed oil. Sulfonation of soybean oil increased the toxicity to M. histrionica from 39 to 87 percent. It was noted during the preparation of the spray solution that sulfonated soybean oil in combination with cube required much less stirring to attain a uniform suspension. It was noted also that the cube particles remained in suspension much longer in sulfonated soybean oil than in the emulsions prepared from the other natural and sulfonated vegetable oils included in these tests. Sulfonation did not reduce toxicity of any of the vegetable oils included in the tests. It appears, therefore, that sulfonated oils could be substituted for the natural oils with considerable facility from the standpoint of mixing sprays in the field.

Control of aphids on lettuce by hydrocyanic-acid gas fumigation.--C. A. Weigel and G. V. Johnson, of the Beltsville, Md., laboratory, in conducting a series of six fumigations with calcium cyanide for the control of aphids on greenhouse-grown lettuce, report that dosages varying from 1/8 to 1/4 ounce per 1,000 cubic feet of space, with exposures made at weekly intervals, were tolerated by the lettuce under conditions simulating commercial practice. A slight bleaching occurred on the edges of the leaves of some of the plants but this condition was shown not to be caused by the fumigation but was apparently intensified by it. Mortality records of aphids on infested plants growing in pots placed in the greenhouse during varying exposures indicated that a dosage rate of 3/16 ounce was necessary to give a satisfactory kill of the potato aphid and a 1/4-ounce dosage was needed to control the green peach aphid. These results agree with those obtained during the course of tests performed in 1937 and demonstrate that this method of control may have a practical application in large-scale commercial fumigations.

Duration of exposure and low temperatures affect mortality of overwintering beet leafhoppers.--Studies performed by F. H. Harries, of the Twin Falls, Idaho, laboratory, on the lethal effect of low temperatures on overwintered beet leafhoppers, demonstrated that the percentage of mortality of the test insects was determined by the duration of the period of exposure, as well as by the existing temperatures. It was found that the duration of the period of exposure necessary to incur complete mortality of the beet leafhopper ranged from approximately 20 days at 30° F., which is near the lowest limit for feeding or physical activity, to less than 12 hours at 0°. These experiments disclosed that the effect of constant low temperatures is more detrimental to the leafhopper than is that of fluctuating temperatures, since an increase of temperature which allowed the resumption of activity each day

increased greatly the ability of the insect to resist exposure to cold. In contrast to the effect of constant temperatures or continuous exposures the resistance to cold or the duration of the period of survival was increased by daily fluctuations to higher temperatures for a short period.

Lead arsenate residues on flue-cured tobacco in storage prevent development of tobacco moth larvae.--W. D. Reed and J. P. Vinzant, of the Richmond, Va., laboratory, report that no larvae of the tobacco moth survived on cured leaves of flue-cured tobacco which were sprayed just before harvest time in the field with a spray containing 4 pounds of lead arsenate to 50 gallons of water, applied at the rate of approximately 50 gallons per acre. An analysis of samples of the tobacco leaves involved in the experiment showed them to contain 3.14 grains of As_2O_3 per pound, or 448 p. p. m. The results of these experiments appear to emphasize the fact that arsenical residues on cured tobacco leaves may constitute an important factor in reducing the population of insects affecting flue-cured tobacco in storage, although the presence of such residues is considered detrimental from the viewpoint of the possible health hazard involved and very often on account of the objectionable discoloration. Usually a larger population of insects is found in warehouses of imported cigarette tobaccos (Turkish types) than in the domestic flue-cured tobaccos, although the latter are not high in sugar content and are kept in storage in this country for a longer period of time. Previous experimentation has demonstrated that the larvae of the tobacco moth and of the cigarette beetle prefer to feed on types of tobacco which contain a relatively high sugar content. In warehouses containing flue-cured tobacco it has been observed that a wide variation exists in the degree of infestation in parts of the same hogshhead, as well as between different hogshheads, and between different sections of the warehouse. It appears that some of this variation may be caused by such factors as tobacco types, moisture content, and proximity to other infested tobacco but, owing to the determination that residues of lead arsenate prohibit the survival of tobacco moth larvae on cured leaves of tobacco, it seems probable that serious consideration must be given to the effects of insecticidal residues on the populations of insects infesting stored tobacco. It is reported that arsenicals are not used on the tobacco crop in Greece and Turkey, where practically all of the cigarette tobaccos imported into this country are grown, and this point may be significant in explaining the high infestations of tobacco moth and cigarette beetle, which often occur in these imported tobaccos.

Lead arsenate controls vegetable weevil larvae in tobacco plant beds.--F. S. Chamberlin and L. L. May, of the Quincy, Fla., laboratory, report that the vegetable weevil was controlled when infesting tobacco in plant beds by the application of lead arsenate sprays or dust mixtures. The infestations by this pest in most of the plant beds in the Quincy district have been rather light during the spring of 1938, but in several instances the damage caused by the larvae of the vegetable weevil was sufficiently severe to necessitate control measures. Experiments in some of the larger commercial tobacco plant beds, where a fungicidal spray was being used to control blue mold, demonstrated that lead arsenate added to this spray at the rate of 3 pounds to 100 gallons of the mixture exerted excellent control of the weevil in most instances, with no detectable evidence of burning of the tender tobacco seedlings. Light applications of a lead arsenate dust mixture to infested plants were also found to result in satisfactory control of the insect.

Leafhoppers predominate in seed beet fields of Salt River Valley during winter.--Studies conducted by O. A. Hills and Van E. Romney, of the Phoenix, Ariz., laboratory, of insect populations in the fields of beets grown for seed in the Salt River Valley during the months of January, February, and March, have shown that leafhoppers (Empoasca spp.) and the beet leafhopper are the predominant species of insects present in the beet fields in this valley throughout the winter period. Plant bugs (Lygus spp.) which are abundant in beet fields in this section during spring, summer, and fall, were not found therein during the winter. Several pentatomids and the mirid bug Creontiades femoralis Van D. occurred in the beet fields throughout the winter but in very small numbers. These last two groups occurred only in sections where cotton is grown and it is quite probable that they were forced from cotton onto sugar beets coincident with the drying of the cotton plants after frost in the fall.

INSECTS AFFECTING MAN AND ANIMALS

Investigations on sand flies concentrated in Florida.--The work on sand fly investigations, which has been carried on at the Savannah, Ga., laboratory of this Division since about 1931, has been transferred to St. Lucie, Fla., and the laboratory at Savannah has been discontinued. It has been combined with a sublaboratory at Fort Pierce, Fla., which was established in 1936 for the purpose of intensifying the study of the sand fly problem along the east coast of Florida, where these insects are a serious economic pest, and to carry on cooperative work with the St. Lucie Sanitary (Antimosquito) District to determine the efficacy of a certain type of control method that appears promising for the abatement of the flies, particularly along the Indian River. J. B. Hull will continue in charge of the investigations, the field laboratory of which will be located at St. Lucie, Fla. S. E. Shields will assist Mr. Hull in the work.

Salt-marsh mosquitoes to be given especial study.--Because of the greatly increasing importance during recent years of the species of salt-marsh mosquitoes as pests at resorting centers, as carriers of equine encephalomyelitis, and due to the effect which present control methods have on certain wildlife habitats, a sublaboratory of the Orlando, Fla., laboratory of this Division has been established at New Smyrna, Fla., for the purpose of undertaking intensive investigations of these pests. The work will include chiefly detailed studies on the biologies of the species and their ecological requirements, the relation of other salt-marsh fauna and flora to the mosquitoes, and the effect mosquito-control operations have on these. Studies will also be undertaken to develop more satisfactory control methods. The sublaboratory will be in charge of G. H. Bradley, formerly of the Orlando, Fla., laboratory, and he will be assisted in the investigations by B. V. Travis and Jack Russell. R. C. Bushland, formerly assigned to the Menard, Tex., laboratory, has been transferred to the Orlando laboratory to replace T. E. McNeel, who has been transferred to the Division of Domestic Plant Quarantine's field station at Foley, Ala.

Mosquito abundance in Columbia River Valley not likely to be as great this year as last.--H. H. Stage, of the Portland, Oreg., laboratory, reports that the flood crest of the Columbia River was reached on May 22 at 13.9 feet. As it is unlikely that there will be an additional rise, the last hatching of Aedes vexans Mg. and A. lateralis (Mg.) is probably over. In

1938 the flood crest was reached at 20.8 feet. The mosquito pest, therefore, should be considerably less than last year in the lower Columbia River Valley. Mosquito-control agencies have also done good control work in Multnomah County, Oreg. Several local but heavy breeding areas of Culex pipiens L. have been located within Portland. This is somewhat in advance of most seasons.

FOREIGN PLANT QUARANTINES

Mango found in spare tire.--On May 12 a car bearing a California license arrived on the bridge at Laredo very heavily loaded with Mexican curios and other merchandise. Some of the merchandise included bottles of liquor cleverly concealed in various parts of the car and the owner was emphatic that he had nothing more to declare. The inspectors noting his haste to be off took this as their cue to give the car a thorough search, with the result that one mango was found concealed in a hub-cap on the spare tire of the car. A fine of \$1 was assessed and collected by the Customs, as well as a substantial fine for smuggling liquor.

Heavily infested sweetpotatoes used as monkey food.--The British M/S Mattawin arrived at Philadelphia April 24, 1939, from British West Africa with monkeys, birds, and snakes as part of her Philadelphia cargo. While this Bureau is not directly interested in this type of cargo, the necessary food which must be carried to feed these animals is often of great interest to plant-quarantine inspectors. A good example of this was found in 100 pounds of sweetpotatoes, approximately 98 percent of which were infested with living Cylas sp. near compressus (Hart.) larvae, pupae, and adults, some potatoes containing as many as 10 larvae. Diplodia tubericola was also taken. Other unused feed included 123 oranges, on which Phomopsis citri was intercepted, 5 pounds of mixed brown and paddy rice, 5 pounds of shelled corn, and 1 pound of kafir corn. The cages were required to be cleaned before they were landed and were reexamined at their destination, after the animals had been removed, to make certain that nothing had been overlooked. The deck and quarters where the animals had been kept were swept and washed down and all sweepings along with the various grains placed in boxes to be dumped at sea. The sweetpotatoes and oranges were destroyed by burning.

Pests on orchids from the Philippines.--The potential pest hazards of a single shipment of plants is emphasized by the following interceptions made on a small shipment of orchid plants at San Francisco consigned to an importer in Alameda County, Calif., from the Philippines: A weevil (Orchidophilus sp.), two species of scale insects (Pinnaspis townsendi and Parlatoria pseudoaspidiotus), a mealybug (Pseudococcus lilacinus), and two species of ants (Camponotus sp. and Crematogaster sp.). None of these economic species are known to occur in California.

Cottonseed in packing material.--On April 20 a box containing a glass lampshade packed in about 3 pounds of Egyptian raw cotton arrived at Buffalo, N. Y., in the mails. Examination of the packing revealed the presence of 40 or more fully developed cottonseeds. While no pink bollworm larvae were found, 5 seeds did reveal damage typical of this insect. The cotton packing was removed and destroyed.

Orchid-disease interceptions.--Among the orchid diseases determined recently are Colletotrichum orchidearum All. on Laelia purpurata in baggage

from British Honduras on December 14, 1938; Miltonia varieties in baggage from Australia on March 23; Paphiopedilum longifolium in mail from Canal Zone on February 23; Stanhopea sp. and S. bucephalus from Mexico on February 21 (mail), March 10 (express), and March 21 (mail); Cytospora sp. (no species reported on orchids) on Epidendrum sp. in mail from Mexico on January 3; Gloeosporium bidgoodii Cke. on Oncidium kerstingii album in mail from England on June 17, 1938, at Honolulu and Oncidium sp. in baggage from Haiti on January 10 at New York; Gloeosporium cattleyae Sacc. & D. Sacc. on Cattleya dowiana and C. skinneri in baggage from Costa Rica; G. coelogyne Syd. on Coelogyne cristata and G. cymbidii Verpl. on Cymbidium tracyanum in mail from India on December 20, 1938; G. stanhopeae All. on Stanhopea bucephalus in mail from Mexico on March 21, and S. tigrina in baggage from Costa Rica on February 20; Gloeosporium sp., with spores too small for G. laeliae Henn. on Laelia purpurata in baggage from British Honduras on December 14, 1938; Gloeosporium sp., with spores smaller than either of species reported on host genus, on Stanhopea sp. in mail from Mexico on January 17; Glomerella cincta (Stoneman) Spaulding & v. Schrenk on Oncidium bicolor in baggage from Brazil on May 2, at New York; Macrophoma oncidii P. Henn. on Vanda caerulea in mail from Siam on December 9, 1938; Pestalozzia sp. (unlike any species reported on orchid but previously intercepted on orchids from Guatemala) on Epidendrum sp. in mail from Mexico on January 3; Physalospora orchidearum P. Henn. on Epidendrum sp. from Mexico on January 3, Stanhopea sp. and S. bucephalus in mail from Mexico on January 17, February 21, and March 21, and Vanda caerulea in mail from Siam on December 19, 1938; and Septonema sp. (perhaps S. orchidophilum Speg. but the description does not mention small connecting cells between spores) on Cattleya deckeri in mail from Canal Zone on January 25. Unless otherwise noted interceptions were made at San Francisco.

Entomological interceptions of interest.--A living larva of the dark fruitfly (Anastrepha serpentina Wied.) was intercepted at New York on February 22 in a sapodilla fruit in baggage from Colombia. A living pupa of the celery fly (Philophylla heraclei L.) was intercepted at Philadelphia on July 15, 1938, on a celery stalk in ship's stores from Germany. A living larva of the weevil Orchidophilus aterrimus Waterh. was taken at Honolulu, T. H., on May 14, 1938, in the stem of an orchid (Dendrobium leporinum) in baggage from the Dutch East Indies. Living specimens of the scale insect Phenacaspis eugeniae sandwichensis Fullaway arrived at Seattle, Wash., on December 28, 1938, on a coconut husk in baggage from Honolulu. Living larvae of the olethreutid Laspeyresia splendana Hbn. was intercepted at San Pedro, Calif., on November 9, 1938, in chestnuts in baggage from Japan. Living specimens of Machatothrips artocarpi Moulton were taken on June 15, 1938, on a dried Annona fruit in the field at Agat, Guam. A living larva of the chrysomelid Psylliodes chrysocephala L. was found at New Orleans on November 28, 1938, in a turnip in ship's stores from the Netherlands. A living specimen of the coccid Orthezia urticae (L.) was intercepted at San Francisco on March 3 on Vitis sp. in cargo from Italy. Living specimens of the pentatomid Oplonus pulcher Dall. arrived at Laredo, Tex., on February 18 on the foliage of orchids in cargo from Mexico. A living adult of the chrysomelid Cassida nobilis L. was taken at Washington, D. C., on December 14, 1938, with packing around fruit trees in express from Poland. Two living larvae of the avocado seed moth (Stenomoma catenifer Wlsm.) were intercepted at Mobile, Ala., on July 21, 1938, in two avocados in ship's quarters from Honduras.

Pathological interceptions of interest.--Alternaria violae Gall. & Dorsett was intercepted on February 26 at Brownsville on leaves of violets in baggage from Mexico. Blennoria buxi Fr. was intercepted at San Francisco on March 15 on 1 plant of Buxus sempervirens in a shipment of 367 from Holland. Botryosphaeria ribes (Tode ex. Fr.) Grossenb. & Duggar in the Dothiorella stage was intercepted at New York on April 17 on a fruit of Chrysophyllum cainito in baggage from Jamaica. This fungus had much the same appearance as Diplodia natalensis. Colletotrichum camelliae Mass. was intercepted at San Francisco on February 21 on Camellia sasanqua in cargo from Japan. Colletotrichum vincae Speg. was found on a Vinca rosea stem in baggage from Bermuda on May 6 at New York. Cylindrosporium camelliae Gz. Frag. was found on a plant of Camellia japonica in cargo from Japan on February 21 at San Francisco. Cytospora sp., Didymella sp., and Didymosphaeria sp., no species reported on peony, were found on 1 to several plants in a large shipment from Japan on February 9 at San Francisco. Mycosphaerella citrullina in the Ascochyta stage was found on shipments of cucumbers from Cuba on February 6 and March 7 at New York. Pestalozzia coccolobae E. & E. was found on leaves of Coccoloba uvifera cuttings in baggage from Bermuda on April 21 at New York. P. dissimulata Thumen was found on April 20 at New York on Eucalyptus globosus leaves in cargo from Italy. Phoma tenuis Pass. was intercepted on special permit material of Camellia japonica from Japan on February 21 and 24 at San Francisco. Phyllosticta epigaeae Pk. was found on trailing-arbutus in mail from Canada on May 23 at Boston. Puccinia levis Magn. was found on leaves of Manisuris rugosa from Mexico on March 27 at New York. P. scirpi DC was intercepted on Scirpus validus straw used as packing for frozen oysters from France on February 9 at New York. Ravenelia arizonica E. & E. was intercepted on mesquite leaves in the bottom of a truck from Mexico on April 6 at Brownville. Rhizoctonia bataticola (Taub.) Butler was intercepted at San Francisco on February 25 in sweetpotatoes from Peru in baggage.

DOMESTIC PLANT QUARANTINES

Baiting operations in northern Great Plains area.--Grasshopper baiting operations in the areas of the northern Great Plains infested with the lesser migratory grasshopper were begun, jointly with the States, counties, and other cooperators, early in May, and reached large-scale proportions by the middle of the month. The unexpected rapidity of the hatch and the severity of the infestation created demands for bait by several counties far in excess of anticipated needs. On idle and abandoned land in this region, Federal operations were begun about the middle of May and by the last week of the month there were 1,316 men and 360 mechanical bait spreaders at work.

Grasshopper baiting in other regions.--Very encouraging results have been obtained in the baiting operations for the long-winged, migratory range grasshopper in areas of Texas, Oklahoma, and New Mexico, where work has been conducted since the latter part of April. The outlook in Colorado is also good. Much of the bait spreading has been done by volunteer or State-employed crews under Federal supervision. Seventy mechanical spreaders were in operation in this area in May. In Arizona, California, and Nevada, strip-baiting was carried on throughout the month of May and proved very effective in protecting crops from migrating hordes of hoppers which moved into the irrigated and valley crop lands from nearby mountain and range areas.

In the Mississippi Valley, Pacific Northwest, and eastern Great Plains States, some baiting was carried on in May but the infestations in most of these areas had not developed to a need for widespread baiting.

General situation on grasshopper control.--The peak of control activities for grasshoppers will probably be reached in June, with over 1,500 Federal workers and many thousands of farmers engaged in fighting the menace. About 1,000 Federal bait spreaders and over 500 Federal trucks are in use for control purposes. The cooperation of other Government departments and of States, counties, communities, and individuals, as well as railroads and other commercial agencies, is much better than in any previous grasshopper control campaign. With rare exceptions, grasshopper kills are reported to be exceptionally good throughout the migratorial areas. By the close of May 73 percent of the estimated needs for bait had been ordered shipped and reserve supplies sufficient for 10,000 tons had been stored at shipping points in the field. Over 2,000 tons in excess of the estimated needs had been shipped to California, Kansas, Montana, New Mexico, and Oregon.

Grasshopper infestations severe in northern Great Plains.--The migratorial grasshopper situation in the northwestern Great Plains area, particularly in eastern Montana, western North Dakota, eastern Wyoming, western Nebraska, and much of South Dakota, was extremely serious in the early part of June, representing probably the heaviest infestation in the last several decades. These infestations have resulted, it is believed, primarily from heavy migrations to these areas originating a year ago on abandoned farm lands and other nonresident lands in the Dakotas. The present infestations are also on idle land, as well as strips of river wastes and much cultivated area. Recent strong winds blew large numbers of adult hoppers into four southwestern counties of Nebraska.

Grasshoppers developed early this year.--By the first week in June the development of grasshoppers in most areas throughout the infested region was fully 2 to 3 weeks ahead of that in 1938.

Mormon cricket control activities.--The peak of Mormon cricket control activities was reached in May in Washington, Utah, and Oregon. In the above States and Idaho, Montana, Nebraska, Nevada, South Dakota, and Wyoming over 98,000 acres has been dusted, nearly 67 percent of that area having been worked with power dusters. Metal barriers have been placed on nearly 64 miles; oil-on-water barriers on 54 miles; and there are in operation 55 miles of trench barriers. Severe infestations are reported from Idaho and Montana, equal to last year's infestations. In one Idaho county where control has not been necessary for 20 years and another for 3 years, it has been necessary to take action to protect the crops. Eighteen power dusters have been put into operation in the State. In Montana, while several counties are found more severely infested than last year, three counties where extensive control operations were carried on in 1938 have only a light cricket population. In Yellowstone County good progress is being effected with 17 power dusters controlling the crickets on 85,000 acres of cultivated land and 352,000 acres of range. From Oregon severe infestations were reported by the press at the Warm Springs Indian Reservation. Through the assistance of C. C. C. men and Indian crews these hordes of crickets have been forced out of cultivated crops. The C. C. C. men, as well as 100 volunteer men, are assisting in the control work in the Pine and Eagle Valleys of Baker County, Oreg., representing 35,000 acres of farm land.

Nevada dusts Mormon crickets from airplane.--Very good results have been obtained by Nevada State officials in dusting crickets from an airplane, an 85-percent kill having been effected 96 hours after operations. The plane carried 500 to 700 pounds of dust materials and 100 acres were treated in an hour at a cost of 70 cents an acre. It was necessary to limit the work to periods when the air was very calm.

Baiting for Mormon crickets.--Based on favorable results obtained through tests by research workers, the use of millrun-sawdust-sodium fluosilicate as a bait for poisoning Mormon crickets has been put into effect in the control operations in South Dakota, where the Mormon cricket and grasshopper infestations overlap. Supervisors report that poisoning by this method together with the sodium arsenite dust has effected kills of from 80 to 95 percent of the crickets.

Control of white-fringed beetle.--Large-scale spraying, fallowing, and dusting operations were well under way in May in several of the areas infested with the white-fringed beetle. Three huge power sprayers are in use throughout the areas, spreading herbicide on railroad yards in an attempt to keep the vegetation down. These sprayers are mounted on flat cars accompanied by from 2 to 4 tank cars of 8,000 gallons each of oil-base herbicide and are operated by air pressure spreading the material over an area 30 to 40 feet wide. One outfit covers 3 railroad tracks at one operation. In general the railroad companies provide the locomotives, cars, and train crews. The Bureau provides the sprayers, operators, and herbicide. In addition, 50 new sprayers for mounting on trucks are being used around lumber yards, industrial plants, and waste lands or other places where vegetation may be destroyed without economic loss. Large dusting machines are being used wherever practicable to spread calcium arsenate dust as an insecticide. Under a recent improvement to the machine a coverage of 65 feet is now effected, 12 pounds of dust being applied to the acre.

Inspections for white-fringed beetles.--An average of 15 larvae of white-fringed beetles to the square yard was recently found in the Florida, Ala., area in a survey of 27 properties comprising 15,000 acres. A maximum of 60 to the square yard was found at some points in the Laurel, Miss., area. Frequent inspections of the Mobile, Ala., area brought to light only 3 larvae. Thirteen new infestations were found at Monroeville, Ala., in the known infested area, and some newly infested properties were found in other areas adjoining known infestations. An identification unit has been established at the field headquarters office at Gulfport, Miss.

New county infested with white-fringed beetle.--An infestation of Naupactus leucoloma Boh. has been found at Maxie, a town near Hattiesburg, Forrest County, Miss. This county, while not previously known to be infested, lies between two other infested counties. Damage was first reported by a Mississippi State inspector on May 26.

White-fringed beetles emerging.--Live adult beetles were found on May 11 at New Orleans, La.; on May 17 at Gulfport, Miss., on May 22 at Suva, Fla., and Florida, Ala.; on May 23 at Laurel, Miss.; and on May 30 at Monroeville, Miss., and Pensacola, Fla.

Objectives in the white-fringed beetle program.---A persistent attempt to eradicate the white-fringed beetle in small isolated areas and to determine the best methods and the cost is believed to be the most important phase of this year's work on the project. Drastic suppression in all areas, thereby reducing the risk of spread to noninfested areas and curtailing costs in quarantine enforcement, will also be worked for. The four primary activities in the two-fold program as worked out with the cooperating States are (1) soil fumigation in certain small areas where eradication is the objective, (2) clean cultivation to free released farm lands from vegetation, (3) the application of weed killers on infested idle and abandoned lands, and (4) the application of insecticides where this type of suppression is practicable.

Peach mosaic court case.---On May 26 the California Supreme Court rendered a decision in favor of the State of California in the case against an organized committee representing a minority of peach growers of the State. The case had been in the courts for the last 3 years. As a result of the decision, approximately 29,000 mosaic-infected trees will be removed in certain areas of San Bernardino and Riverside Counties. In the last 3 years 76 percent of the owners had already consented to the removal of diseased trees and the indications are that in future full cooperation will be received from all members of the opposition group.

Peach-inspection activities.---Peach mosaic inspection in May was confined largely to the environs of peach nurseries and of budwood sources in the 7 Southwestern States in which the disease is known to exist. Under standardized quarantines of the infected States, peach nurseries and peach budwood sources, as well as the 1-mile zones surrounding them, must have been inspected and all diseased trees removed prior to May 15, in order to meet certification requirements. Over 200 nurseries and a similar number of budwood sources were inspected and only 9 failed to meet that requirement. In addition there are 12 nurseries in Mesa County, Colo., so located in the heavily infected area that they could not meet the certification requirements. General orchard inspection for the peach mosaic disease was also conducted during the month in Arizona, California, Colorado, New Mexico, Oklahoma, Texas, and Utah. Phony peach inspection was well under way in May in nurseries in Arkansas, Georgia, Tennessee, and Texas. There are 172 inspectors making inspections for these diseases, 123 being Federal employees, 44 State men, and 5 county inspectors. There were 946 relief employees engaged in removing abandoned and escaped peach trees in 12 infected States by the last of May.

Sweetpotato weevil control.---Inspections of stored sweetpotatoes, of sweetpotato planting stock, plant beds, volunteer sweetpotato plants on infested properties, and of wild host plants were made in May in Alabama, Georgia, Mississippi, and Texas. Storage places were cleaned, plant beds removed, volunteer sweetpotato plants destroyed with the work of W. Pa. A. laborers, and quarantine regulations enforced. One shipment of 5,000 infested sweetpotato plants shipped into Alabama was destroyed, and several other uncertified shipments were confiscated under State authority. Quarantine signs were erected on the Georgia-Florida State line notifying the public of the penalty and danger in bringing contraband material into Georgia. The Texas work was centered on properties under quarantine in 3 counties and

on making a survey for weevils in Panola County. The number of certified growers in that area has more than doubled in the last year. No weevils were found in Panola County. In the 4 States, 284 properties were inspected during the month and 31 infestations were found. Reinspection was made of 1,337 properties in the quarantined areas.

Sweetpotato weevils diminishing in Georgia.--Cooperative eradication measures are in progress in Thomas and Glynn Counties, Ga., the only counties in the State in which weevils are known to exist. Camden and Charlton Counties are believed to have been freed from the pest. Previously infested centers are periodically checked, however, by the State inspectors, and much educational and regulatory work is conducted throughout the southern part of the State. The control activities mentioned in the April News Letter, as carried on in 11 Georgia counties, referred to reinspections, surveys of stored sweetpotatoes, and educational and regulatory work.

Public becoming quarantine conscious.--It is the general observation of transit inspectors at all the Midwest points that the proportionate number of certified parcels, as compared with uncertified parcels of plants, shipped by individuals in the East has so increased that it appears the public is better aware of and is complying more fully with the Japanese beetle and gypsy moth quarantine regulations than in former years. This was also the comment of inspectors in the East with respect to Christmas shipping last year.

Violations intercepted.--There were 504 quarantine violations intercepted by transit inspectors in May, and California State inspectors reported the interception of 11 violations of Federal domestic plant quarantines. With the assignment of additional inspectors at New York City, six tours of inspection were made possible over hours ranging from 1 a.m. till midnight. The work of an Illinois inspector assisting at Chicago and of a Nebraska inspector at Omaha has been of substantial assistance in the spring nursery-stock shipping season.

Citrus canker eradication continues in Texas.--Work during May consisted principally in "strip working" for escaped Citrus trifoliata trees, areas in Texas from which these trees had been eradicated in the past. This work was accomplished with 148 relief laborers. Over 100,000 such trees were removed during the month. Inspection activities were also carried on by 9 Federal inspectors in 4 counties of the Galveston region. There were 632 properties inspected. No canker has been found in Texas since September 19, 1938, when a recurrent infection was located near Alvin.

CONTROL INVESTIGATIONS

Toxicity to housefly of optically active and inactive compounds of rotenone series.--A study was made on the toxicity to the housefly of optically active and inactive compounds of the rotenone series by W. N. Sullivan, of this Division, and L. D. Goodhue and H. L. Haller, of the Division of Insecticide Investigations. The materials prepared and tested were racemic deguelin, racemic dihydrodeguelin, levo-beta-dihydrorotenone, levo-dihydrodeguelin, levo deguelin concentrate, levo dihydrorotenone, and rotenone.

To determine the effect of the solvent on mortality, these preparations were tested as acetone and kerosene-cyclohexanone sprays. Of the acetone sprays, that containing rotenone was the most toxic. The optically active substances, levo dihydrorotenone, levo deguelin concentrate, levo dihydrodeguelin, and levo-beta-dihydrorotenone were somewhat less toxic than rotenone. However, racemic deguelin and dihydrodeguelin were markedly less toxic than the corresponding levo forms. Also, the dihydro derivatives of rotenone and deguelin were less toxic than the parent compounds. The kerosene-cyclohexanone solvent gave similar results with but one important exception. Levo deguelin concentrate and levo-dihydrodeguelin were markedly more toxic than the racemic forms when acetone was the solvent, but they were of about the same toxicity when kerosene-cyclohexanone was the solvent. These results again point out that in order that any good insecticidal possibility may not be overlooked, a number of methods and variations of the same method should be used.

Knocked-down houseflies found more resistant to fly spray.--At the summer meeting of the National Association of Insecticide and Disinfectant Manufacturers in New York on June 5, E. R. McGovern, W. N. Sullivan, and G. L. Phillips reported that houseflies (Musca domestica L.) that had been knocked down (paralyzed) with ether, acetone, or kerosene sprays low in pyrethrin content (0.5 mg. per cc.) were more resistant to kerosene sprays high in pyrethrin content (2.0 or 4.0 mg. per cc.) than were normal, active flies. The tests were made by the turntable method. The flies were knocked down by an acetone or pyrethrin-kerosene spray or ether vapor during a 10-minute exposure in the spray cylinders. The flies were next exposed to the atmosphere in the laboratory for 5 minutes and then resprayed. Higher mortalities were obtained where the 2 mg. of pyrethrins per cc. of kerosene spray was applied to the normally active flies, followed by a 0.5 mg. per cc. of spray than where these same sprays were applied in reverse sequence. These results indicate that to use the insecticidal constituents of a kerosene-pyrethrin fly spray most efficiently in fly control the insects should receive a lethal dose of the spray before being knocked down.

INSECTICIDE INVESTIGATIONS

Nicotine on apples.--The increasing importance of tank-mix nicotine bentonite in the control of codling moth has drawn attention to the question of nicotine residues on apples. L. N. Markwood has just published in the Journal of the Association of Official Agricultural Chemists (v. 22, No. 2, May 1939) a procedure permitting the determination of the nicotine on a single apple, which will make the studies of distribution and permanence of nicotine as simple as those of lead and arsenic have become. The method employs a color reaction between nicotine and a mixture of cyanogen bromide with beta-naphthylamine, the red color developed being measured in a suitable photometer.

Basic copper arsenate.--The Journal of Economic Entomology for February 1939 (v. 32, No. 1, p. 142) carried an article entitled, "Basic Copper Arsenate--A New Insecticide," by E. D. Witman, H. A. Waters, and E. F. Almy. The authors described the material as being a definite chemical compound of the formula $4\text{CuO} \cdot \text{As}_2\text{O}_5 \cdot 5\text{H}_2\text{O}$. The Division of Insecticide Investigations has recently analyzed for various field stations four samples of this material, and it is felt that other stations may be interested in our findings. The

results of our analyses of the samples as received are given in the table, in comparison with the theoretical figures.

Results of analyses	Cupric oxide: (CuO) Percent	Total arsenic oxide: (As ₂ O ₅) Percent	Molecular: ratio CuO/As ₂ O ₅	Water soluble As ₂ O ₅
Theory-----	56.21	40.61	4.00	--
Found-----	53.5	38.4	4.03	0.01
Do-----	53.5	38.6	4.01	.01
Do-----	54.5	38.5	4.09	.10
Do-----	54.7	38.7	4.09	.06

It is evident that the commercially produced material is quite close to the composition claimed by the manufacturer. The water-soluble figures quoted were obtained by the method of the Association of Official Agricultural Chemists, using 2 grams of material per liter, and hence are equivalent to 0.2 to 2.0 milligrams per liter, as compared with the 3 milligrams per liter quoted in the article cited.

BEE CULTURE

Bees quickly separate pollen from honey in honey sac.--An experiment conducted at the Bee Culture laboratory in Davis, Calif., on giving bees pollen mixed in liquid honey gave results contrary to those anticipated, inasmuch as no brood was reared to maturity when bees were thus fed. Frank E. Todd, in charge of the laboratory, reports as follows regarding the colony used in the experiment: "No feeding was made during the first 10 days and no egg laying occurred. Then pollen in liquid honey was fed and within 3 days egg laying began in what appeared to be a normal manner, the area expanding in proportion to the bee force present. The eggs hatched in 3 days, but although eggs and young larvae were numerous, older larvae did not appear, nor sealed brood. The colony was fed pollen in liquid honey for 18 days, but no larvae reached sealed stage until dry pollen was fed the colony. During this feeding period most of the brood (63 percent) died in the larval stage. The greatest mortality (31 percent) occurred between the second and third days, when the food of larvae is normally changed from royal jelly to honey-pollen. It appeared that the larvae were not receiving the pollen, although it was being fed to the colony. The colony was next given a comb containing pollen, which had been powdered from pellets trapped earlier in the year and air-dried. An improvement in the efficiency of brood rearing occurred at once. The larvae appeared better fed and a larger percentage (29 percent) were carried through to sealing and maturity. The length of life was considerably increased on this type of food. Then followed the period when fresh pollen from the field came in noticeable quantity and brood rearing efficiency again increased to somewhat near normal (77 percent). The conditions observed here in detail were similar to those observed in the colonies in the apiary where similar feeding was done. It is concluded that pollen fed in liquid honey in the absence of a pollen reserve gives negative results in brood rearing. The reasons for these negative results were not at first apparent. It was noted that the yellow liquid fed did not appear stored in the combs, but instead the stored honey

was clear. Some of the pollen was then dyed with brilliant green, a specific dye for pollen but not for sugar. Of the 1,161 cells stored and checked, green color appeared in only 7 cells (0.6 percent) as apparent to the naked eye. Microscopic examination showed a few dyed pollen grains present in these apparently clear cells of honey, which identified their source. Comparative counts have not yet been made, but examination showed that the amount of pollen was greatly reduced during transport from feeder to storage cell. Bees feeding on the dyed material showed relatively clear honey in the honey sac and dyed pollen grains in abundance in the ventriculus, small intestines, and hind intestines in the manner described excellently by Whitcomb and Wilson (Wis. Research Bul. No. 92, 1929), which showed the rapid and selective action of the pro-ventriculus. This seems uncanny. That bees could not carry this pollen from the feeder to the starving larvae, because of its action, is hard to believe but this appears to be the reason for the negative results obtained in these feeding tests. The problem of how bees do carry pollen to the larvae remains to be solved. It may have a bearing on why pollen reserves some distance from the brood are apparently not utilized efficiently."

IDENTIFICATION AND CLASSIFICATION OF INSECTS

Incorrect scientific name applied to raspberry fruitworm.--The raspberry fruitworm, long supposedly well known under the name Byturus unicolor Say, appears to be not that native American species, whose real habits remain unknown, but one of the exotic forms whose introduction and spread from the Atlantic to the Pacific seems to have escaped our notice until now. The inadequate samples available suggest that a second, and perhaps even a third, exotic species may have become established in this country but the taxonomy of this small group, which is in no respect part of the Dermestidae as commonly stated, is very much confused. The species are very similar in appearance, although their habits may be very dissimilar. If samples, preferably alcoholic, are preserved in field stations, their examination in the Insect Identification Division at this time would be opportune. Especially needed are samples which might suggest the host plants or habits of our several native species. Pin labels "ex galls on oak" and "reared Monterey cypress" on available specimens suggest varied habits which should be verified because preparatorial errors in deciphering note numbers sometimes produce very misleading records.

A new generic name for the tomato pinworm.--In a recently published paper by August Busck (Proc. U. S. Nat. Mus., v. 86, pp. 563-593, 1939), restricting the concept of the genus Gelechia Hubner and treating the American species that have been referred to that genus and to Gnorimoschema Busck, 7 new genera are erected and 5 older generic names removed from synonymy. All but 17 of the species formerly listed under Gelechia are referred to other genera; and 4 species (lycopersicella Busck, glochinella Zeller, elmorei Keifer, and altisolani Keifer) are transferred from Gnorimoschema to the new genus Keiferia. The new combination for the pinworm is, therefore, Keiferia lycopersicella (Busck). The potato tuber moth (operculella Zeller) still remains in Gnorimoschema.

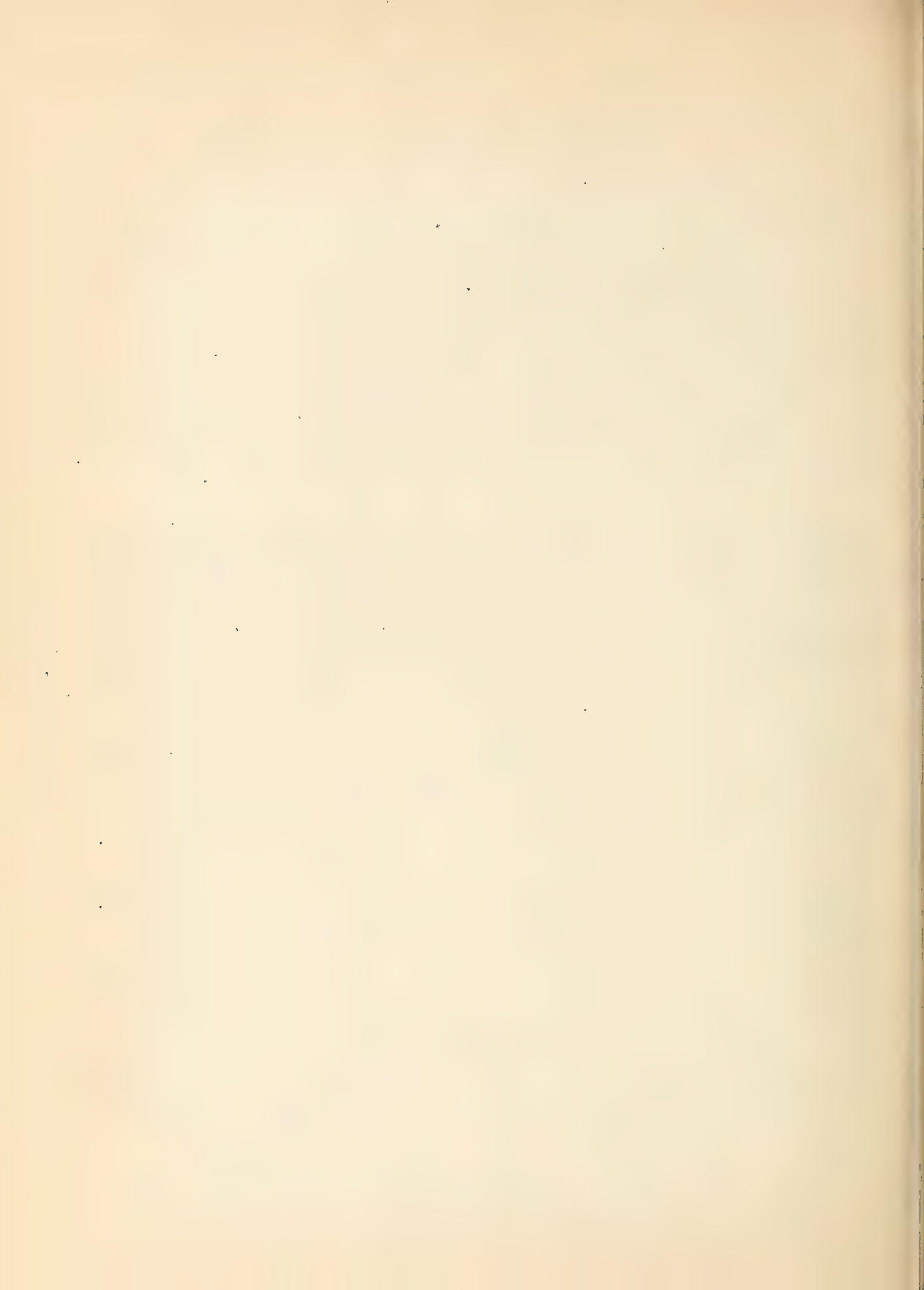
A parasite of the furniture carpet beetle.--Twenty specimens of a bethylid parasite, determined as a new species of Laelius, were submitted by E. A. Back, who had reared them from the furniture carpet beetle Anthrenus

vorax Waterh. This appears to be the first record of the rearing of a parasite from that pest.

Outdoor roaches infesting houses.--Each spring specimens of normally outdoor-dwelling roaches are submitted for identification, following their capture in houses. The species most often entering houses from the outside is Parcoblatta pennsylvanica (Deg.). This species ranges over much of the eastern half of the country, but in houses is ~~most~~ often found in the Northeast or about the Great Lakes. Recently a specimen of Parcoblatta virginica (Brunner) was collected in a house at Arlington, Va. These native roaches normally live beneath loose bark, about decaying stumps and logs, or in other favorable woodland situations, but fly actively to lights in considerable numbers and occasionally enter houses. The wings of the females of most species of Parcoblatta are not sufficiently long to permit sustained flight, so that the males are most often encountered in homes. The species do not ordinarily become thoroughly established.

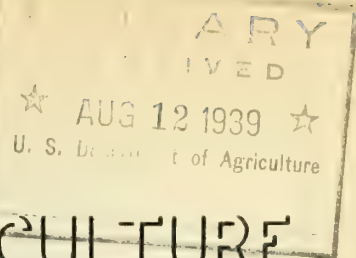
The author of the scientific name for the citrus whitefly.--Inquiries have been received from various sources concerning the author of the name Dialeurodes citri. This is because in some of the literature dealing with the citrus whitefly Ashmead is cited as the author, while in other publications the name is ascribed to Riley and Howard. In 1883, Ashmead described Aleurodes citri in the Florida Dispatch (v. 2, No. 42, p. 704). Riley and Howard redescribed the species in 1893 in Insect Life (v. 5, pp. 219-226), and for years afterwards these authors were usually credited with the name. Although this error was noted by Quaintance and Baker in 1917 (U. S. Nat. Museum Proc., v. 51, No. 2156, p. 408), Riley and Howard have since been quoted occasionally as the authors of citri. The correct, complete citation of Ashmead's description apparently had not been mentioned until 1932, when Essig reprinted the complete description (Jour. Econ. Ent. v. 25, No. 6, pp. 1207, 1208) as copied from the Florida Dispatch of November 12, 1883. Since citri has been transferred from the genus Aleyrodes the correct combination for the citrus whitefly is Dialeurodes citri (Ashm.).

An addition to the collection of Lepidoptera.--Through the kindness of Mrs. Ely, the collection of Microlepidoptera of the late Charles R. Ely has been donated to the National Museum. The collection consists of about 3,000 specimens and includes paratypes of several species described by Dr. Ely.



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UNITED STATES

DEPARTMENT OF AGRICULTURE



BUREAU OF
ENTOMOLOGY AND PLANT QUARANTINE
NEWS LETTER

VOLUME VI



UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

NEWS LETTER

FOR JUNE 1939

Vol. VI, No. 8

(Not for publication)

August 1, 1939

FRUIT INSECT INVESTIGATIONS

More on dichloroethyl ether for control of plum curculio.--Oliver I. Snapp, of the Fort Valley, Ga., laboratory, has just reported on further experiments in the use of dichloroethyl ether for soil treatment against the plum curculio. These experiments were designed to determine whether the water load can be reduced in using dichloroethyl ether on the soil under the spread of peach trees for the control of this insect. They were carried on in soil boxes at the laboratory, 750 curculio larvae being placed in each box. Two dosages of dichloroethyl ether were tested--1/3 fluid ounce and 1 fluid ounce per square yard--carried in quantities of water ranging from 1/2 pint (in which case the dichloroethyl ether was emulsified) to 1 gallon per square yard. With the higher dosage of the chemical, 100 percent mortality was obtained with all quantities of water. With 1/3 fluid ounce of the dichloroethyl ether, the mortality was complete when 1 gallon of water was used per square yard, and 98 percent when the quantity of water was reduced to about 1/2 pint.

Beginning of flight of dried-fruit insects.--Dwight F. Barnes and George H. Kaloostian, of the Fresno, Calif., laboratory, report that operation of a rotary net in a raisin-storage yard from March 2 to April 30 gave data on the beginning of flight of a number of species or groups. The list, with dates, follows.

<u>Ephestia figulilella</u> Greg., March 18	<u>Laemophloeus ferrugineus</u> (Steph.), March 18
<u>Ephestia elutella</u> (Hbn.), March 30	<u>Carpophilus hemipterus</u> (L.), March 6
<u>Ephestia kuehniella</u> Zell., March 16	<u>Tribolium castaneum</u> (Hbst.), April 2
<u>Ephestiodes nigrella</u> Hulst, March 16	<u>Scobicia declivis</u> (Lec.), March 24
<u>Plodia interpunctella</u> (Hbn.), March 21	<u>Cnemeplatia sericea</u> Horn, March 17
<u>Ahasverus advena</u> (Waltl.), March 16	<u>Enicmus</u> spp., March 26
<u>Cryptophagus lepidus</u> Casey (?), March 3	<u>Plochianus pallens</u> (F.), March 21
<u>Typhaea stercorea</u> (L.), March 16	

Japanese beetle emergence in 1939, preliminary note.--Observations by various members of the staff of the Japanese beetle laboratory at Moorestown, N. J., indicate that general emergence of the Japanese beetle for the season 1939 is from 10 days to 2 weeks later than for the last several years. Although it is as yet too early to definitely compare the infestation during the current year with that of 1938, the early observations indicate that the heavy infestation, as for the last several years, will be centered in the

northern half of Delaware, northeastern Maryland, and southeastern Pennsylvania. A very heavy infestation has been noted on the lower Eastern Shore of Maryland, with a considerable defoliation. The infestation in southwestern New Jersey gives early indication of being locally severe. For the first time since 1935 there appears to be some increase in the infestation in the oldest infested area, the New Jersey portion of the Philadelphia suburban area. Throughout most of north-central New Jersey and Pennsylvania north of Philadelphia indications are that the infestation will be somewhat lighter than that of a year ago. In the more northern portions of the area of general infestation emergence has not yet progressed far enough to indicate the general situation. The relatively cool weather during the early part of July has been accompanied in general by less beetle-feeding activity than would be the case in a normal year.

Colonization of an imported parasite of Japanese beetle.--During May and June collection and colonization of Tiphia vernalis Roh. was carried on at the Japanese beetle laboratory. Sufficient numbers of female T. vernalis were collected from 17 of the established colonies in Pennsylvania, New Jersey, and Delaware to provide for 145 colonies of 100 females each. These colonies were released in the field as follows: Maryland, 40 colonies; New York, 50; Connecticut, 25; Delaware, 10; Pennsylvania, 10; and New Jersey, 10. Representatives of the States of Maryland, New York, and Connecticut cooperated with the Bureau personnel in the colony distribution in those States.

MEXICAN FRUITFLY CONTROL

Fruitfly status in the lower Rio Grande Valley.--Traps in the valley took 3,553 Anastrepha ludens Loew and 21 flies were also trapped in the Laredo area. By far the greater number of these flies were young. It was evident that most of them had just recently emerged, as many were poorly colored and only a small number of the females were gravid. The tree-to-tree inspection was completed before the last of June. On several properties "off-bloom" fruit was found to be infested but no larvae could be found in next season's fruit. Heavy rains throughout the area have caused the trees to put on new growth and will hasten the development of the new crop. Other than that caused by rust mites, no insect damage was reported.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Soil depths for white grubs in Wisconsin.--T. R. Chamberlin, Madison, Wis., reports that records are being kept of the depths in the soil at which all white grubs are found. A summary, which is based on all samples taken between April 26 and June 30 in which holes were 20 inches or more deep, is given below. Twenty-three samples aggregating 301 1/40,000-acre holes in 13 fields in the Lamont, Gays Mills, and Fennimore districts of southwestern Wisconsin are included.

Soil depths	Total grubs found	
	Apr. 29-May 16	May 31-June 30
	Percent	Percent
Sod-----	11.2	71.1
4-10 inches-----	21.5	21.5
10-15 inches-----	30.1	7.4
15-20 inches-----	34.0	.7
20-25 inches-----	*3.2	*0

* This record is not complete, as many holes were only 20 inches deep.

These records are interesting in that they show relatively few grubs above the plow level between April 26 and May 16, when many sod fields were plowed; consequently plowing during this period had little effect on grub populations.

JAPANESE BEETLE CONTROL

Dutch elm disease scouts recruited from colleges.--Approximately 2,300 men were notified during the week beginning June 5 to report for Dutch elm disease scout training on June 12. Universities and colleges as far west as Illinois were notified of the availability of these jobs and were requested to recommend students, preferably those who had taken courses in the biological sciences and who were adapted to this type of work. Enough men reported to the training schools in Connecticut, New York, New Jersey, and Pennsylvania to make up a maximum force of 1,470 trainees during the week of June 12-17. Approximately 600 of the 1,350 men remaining on June 17 were from those sponsored by the colleges. The quota established for the entire work area is 1,500 fully trained and capable scouts. Nearly 1,000 men did not report for work because of the uncertainty of continued employment in the absence of appropriated funds for continuance of the work beyond June 30, the short notice that was given, and the fact that the \$4 per diem rate offered did not prove attractive enough to men who would be obliged to live away from home. The men who reported and were accepted for training have proved to be a very promising lot. About 150 proved unacceptable for the work. Employment of this large number of per diem scouts on regular funds was made possible by the appropriation of \$100,000 for Dutch elm disease eradication work in the Second Deficiency Appropriation Bill approved May 2. These men will augment the W. P. A. scouts who were trained in scout schools during the week June 5 to 10.

Scout crews organized in isolated infection areas.--Five regular and 5 W. P. A. foremen were assigned with 16 W. P. A. and 6 regular scouts to systematic scouting in the Indiana area on June 2. The work was started in Marion and Hamilton Counties. Scout school had been held in the Indiana area during the week May 29 to June 3. Scout training was resumed on June 1 in Athens County, Ohio. Eight of the 12 crews allotted to this area were fully organized and started their activities on June 10. Wilting was

showing up to an appreciable extent on the latter date, and an average of 15 samples per day were collected. The Ohio scouts on regular funds were organized on June 19 into 2 railroad and river crews and 3 systematic auto-foot crews to scout the Hocking River and the Baltimore and Ohio Railroad from Athens to the Ohio River and to Belpre, respectively, as well as from Athens west toward Chillicothe, Ohio. In the Cumberland, Md., area, 43 men were selected for employment as scouts on June 1. Scouting was started in the Cumberland, Md., and Bolivar, W. Va., areas the week beginning June 5. Very little wilt was showing at that time, but both American and European elm bark beetles were found. By the end of the month the West Virginia area was nearly completed on the first survey. Scouting was also done in Washington, D. C., around the Capitol and the Tidal Basin.

Scouting by autogiro for Dutch elm disease.--By June 5, the five Bureau-owned autogiros had been completely overhauled and were in readiness at the U. S. D. A. Airport at Preakness, N. J., for the Dutch elm disease scouting program. Men to be assigned to the ground crews working in conjunction with the aerial crews attended scout schools in Springfield, N. J., and Poughkeepsie, N. Y. On June 22 a pilot and an observer started aerial scouting in the southeastern portion of the advance survey area in Connecticut. Owing to the heavy elm concentration in the Connecticut work area the progress of the ground crews was slow. Many storm-damaged elms have been sampled and a large number were found to be beetle infested. By the end of the month the aerial scouting crew in Connecticut had covered approximately 60 square miles. The New Jersey advance survey work, combining autogiro and ground crews, is progressing rapidly, owing to the light elm population in the southern part of the State. Perimeter scouting by ground crews was performed along the major highways located in the cities of Reading, Harrisburg, Sunbury, Wilkes-Barre, Kingston, West Pittston, Scranton, and Waverly, Pa., and Albany and Binghamton, N. Y. Wilt was not apparent in the latter areas, the major symptom observed being staghead and flagging. About 20 miles northeast of Binghamton, N. Y., the staghead condition of the elms diminished and only a few stagheaded elms showed discoloration when sampled. The Scolytus population in the Albany area was found to be low, although Hylurgopinus was numerous.

Newly discovered Dutch elm disease infections.--Among the most important of the first-record infections reported in June were confirmations in the town of Saugerties, in Ulster County, N. Y., and the town of Pine Plains, Dutchess County, N. Y. These are the northernmost infections thus far discovered. Contiguous to the older New York infected zone, a confirmation was reported from the town of Newburgh, in Orange County. In New Jersey scouts sampled two elms, later confirmed as infected, in Hamilton Township, Mercer County. One of these is located just outside the city limits of Trenton. Discovery of infected trees in the townships of Falls and Solesbury, Bucks County, Pa., also added these political subdivisions to the infected zone. The first confirmation in the Athens, Ohio, area for 1939 was received on June 16. This tree is located on a farm approximately $1\frac{1}{2}$ -miles southeast of the 1938 diseased tree, on the Athens State Hospital property. A second case of the disease, on the same property, was confirmed on June 26.

W. P. A. Dutch elm disease workers laid off.--Pending allotment of further funds in the new fiscal year, all security-wage employees were terminated on June 30 until recalled. Field activities were continued by the per diem and appointed personnel only.

New Jersey corn borer infestation.--European corn borer infestation has been abundant in sweet corn and a few small infestations have been reported in potatoes. Larvae of the second instar were the most advanced stage reported by the end of June.

Japanese beetle control activities on the Eastern Shore of Virginia.--A scout assigned on July 7 to survey for early beetle emergence at Cape Charles, Va., reported plenty of beetles present on the first day out. The adults were approaching peak flight by July 14. A constant stream of complaints was received at the Salisbury, Md., office concerning beetle damage to corn and other farm crops. In preparation for the seasonal quarantine effective June 15, 326 refrigerator cars had been examined and sealed prior to that date on the Eastern Shore of Virginia. Two shippers at Atlantic, Va., have constructed certified packing houses so that they may ship potatoes under certification without fumigation after loading. One has screened storage space and the other has his entire packing house screened. About 150 cars arriving at Cape Charles via ferry were screened during June prior to their movement through the heavily infested area. Most of these arrived at night and were screened before the daily flight period.

Trapping Japanese beetles at airports.--Japanese beetle traps were set at a number of the major airports on air routes out of Newark, N. J. During May and June traps were placed at the transport air bases at Atlanta, Ga., St. Louis, Mo., Winston-Salem, Greensboro, Charlotte, and Raleigh, N. C., and Dayton and Columbus, Ohio. Arrangements were made to place traps at the municipal airports at Chicago and Indianapolis early in July. Two inspectors will also be stationed at the Newark, N. J., airport as soon as beetle flight assumes swarm proportions in that section. These inspectors will work with all commercial lines, National Guard officers, and individuals connected with private airplane firms in an effort to obtain their cooperation in keeping all plane openings closed during the flight period, except as necessary to enter for cleaning and check-up purposes and for the loading of passengers.

Soil treating at isolated beetle infestations.--During June, 80 acres of soil were treated for control of the Japanese beetle in cities in Illinois, Indiana, and Ohio. In Chicago, where soil treatment started on May 22, 52.8 acres had been treated up to June 30, of which 43.2 acres were sprayed in June. At Fort Wayne, Ind., 20.1 acres were treated from June 12 to 27. Treating at Logansport, Ind., begun on May 25, continued until June 9, with a grand total of 16.05 acres covered, 9.05 acres of which were treated during the month. Treating started at Belpre, Ohio, on June 29, the treatments continuing into July. At Marietta, Ohio, 6 acres were sprayed during the period June 13 to 28.

Methyl bromide fumigation supplanting lead arsenate soil treatment of nursery plots.--Throughout the Japanese beetle regulated area the re-leading of nursery plots was approximately one-half of the acreage treated in 1938. The analyses indicated very little loss of lead arsenate content during the past year in those plots where the dosage was up to requirements last year. A number of the treated plots are being abandoned in favor of the methyl bromide fumigation of nursery stock.

Scouts inoculated.--Scouts working under the jurisdiction of the Richmond, Va., office in Tidewater Virginia, the District of Columbia, and nearby Maryland were inoculated against the Rocky Mountain spotted fever on June 28 at the U. S. Public Health Dispensary, Washington, D. C. A second inoculation was given 1 week later. Dog ticks are prevalent in the area where the men will be scouting.

Japanese beetle found in Bermuda.--Information was received at Washington from T. A. Russell, Director of Agriculture, Paget East, Bermuda, that a living Japanese beetle was found in mid-June in Bermuda opposite the docks where passengers from the United States arrive.

Fumigation of refrigerator cars.--Fumigation of farm products with methyl bromide at the Pennsylvania Railroad yards at Edgemoor, north of Wilmington, Del., was begun on June 16.

New England farm products inspection.--At Portland, Maine, 18 Japanese beetles were removed from beans inspected and certified for shipment by truck to localities outside the regulated area. Twelve beetles were removed from beans inspected at Boston, Mass., for movement to nonregulated points. These infested beans were from New Jersey and Maryland.

Trapping activities.--In June trapping for the Japanese beetle was started in 5 cities in Georgia, 2 in Illinois, 2 in Kentucky, 23 in North Carolina, 11 in Ohio, 1 each in South Carolina and Tennessee, 23 in Virginia, and 8 in West Virginia.

Road-patrol interceptions.--During June, 574 Japanese beetle adults, 24 larvae, and 1 pupa were intercepted at the 26 highway-inspection stations operated in Ohio, Pennsylvania, Virginia, and West Virginia.

Gypsy moth defoliation.--District inspectors have observed defoliation by gypsy moth caterpillars in two small areas in Rockingham and Chester, Vt. Heavy defoliation was reported in the Cape section of Massachusetts, with very heavy feeding on Mount Tom in Holyoke, Mass. Defoliation was also observed in Portsmouth, Hampton, Winchester, Swanzey, and Walpole, N. H. In Maine considerable defoliation was noted in York and Cumberland Counties. Owing to the late hatching of gypsy moth egg clusters, the peak of defoliation will probably not be reached until the middle of July.

Contractor's equipment infested.--Fifty-three gypsy moth larvae were taken from a truckload of contractor's equipment inspected at Monument Beach, Mass., prior to movement to Tivoli, N. Y.

FOREST INSECT INVESTIGATIONS

Wingless aphids overwinter in subfreezing temperatures.--An unusual occurrence of wingless forms of the aphid Cinara curvipes (Patch) on white fir was noted during the winter of 1938-39 by C. B. Eaton, of the Berkeley, Calif., laboratory. Three colonies of this insect were found on young fir trees at Hat Creek, Shasta County, in mid-February, when minimum air temperatures between 20° and 25° F. were recorded nearly every day. The aphids survived temperatures as low as 15°, and were exposed to several snowstorms

aggregating from 3 to 4 inches at a time with no apparent ill effects. The insects appeared to be actively feeding during the warmer part of the day, when the air temperatures reached 45° to 50°. Colonies caged up early in the spring produced winged adults about the middle of May. So far as it has been possible to ascertain, this is the first time the species has been observed overwintering in the wingless stage under such conditions.

Cylindrocopturus longulus damages Douglas fir reproduction.--This small weevil, which also attacks pine, larch, and true fir in the Pacific coast States, is notably abundant this year on Douglas fir reproduction in the prairie district south of Puget Sound, in western Washington, according to R. L. Furniss, Portland, Oreg. The larvae kill lateral and terminal branches, and in some cases entire trees of small size, by making meandering galleries in the living bark. Damage is most pronounced on poor sites, particularly where the organic top soil is thin and underlain with gravelly subsoil. Trees less than 25 feet high, grown in the open are preferred and seldom are trees over 12 feet seriously affected. Under normal conditions high mortality of young larvae results from host resistance, but in trees of low vigor weevil survival is much greater. It is believed, therefore, that the present outbreak resulted from drought during the growing season of 1938, when all records of moisture deficiency for western Washington were broken.

Defoliation of bitterbrush in Oregon.--A serious defoliation of bitterbrush (Purshia tridentata) by the Great Basin tent caterpillar (Mala-cosona fragilis (Stretch)) on the Deschutes National Forest, Oreg., has recently been brought to the attention of the Portland laboratory and has been investigated by J. M. Whiteside. Bitterbrush rates as one of the most valuable native forage shrubs and is intensively grazed by sheep, therefore its defoliation by these caterpillars represents a serious and important problem in the management and utilization of the range. The present epidemic probably started in an area of about 640 acres in 1937, increased very greatly in 1938, and has become so widely spread in 1939 that artificial control measures are out of the question. Caterpillars are in evidence on three ranger districts but are most heavily concentrated on two grazing allotments on the Fort Rock Ranger District. On portions of these allotments 100-percent defoliation was the usual condition found in 1939.

Places of pupation for Great Basin tent caterpillar.--While collecting cocoons of the Great Basin tent caterpillar on bitterbrush on the Deschutes National Forest, Mr. Whiteside took notes on the more important places of pupation and the number of cocoons collected therein. Cocoons were found under boards, limbs, and logs, on the plants, and in other places, but the greatest number were collected (1) inside the caterpillar tents, (2) in stools of Idaho fescue grass, and (3) under the loose bark of ponderosa pine stumps. The results of 150 random collections on June 1-2 are given below.

Location	Trials: Cocoons		Per trial	
	Number	Number	Mean	Greatest
Pine stumps-----	50	96	1.92	8
Grass stools-----	50	122	2.44	8
Caterpillar tents---	50	168	3.36	12

The first caterpillars pupate inside the tents. In the grass stools most of the cocoons were collected close to the ground line in the dead and dry grass. The cocoons in the decaying stumps lie close to the cracks and edges of the bark.

Natural factors check pandora moth epidemic on Arapaho National Forest.--Although the pandora moth infestation in lodgepole pine on the Arapaho National Forest, Colo., spread over a much larger area than last year, the caterpillars are not numerous enough in any area yet observed to cause serious defoliation, according to reports by N. D. Wygant, of the Fort Collins, Colo., laboratory. Abnormally low winter temperatures were believed to have killed many of the overwintering larvae and at present a wilt disease is taking a heavy toll. It is estimated that approximately 25 percent of the caterpillars have been killed this spring by this disease. Caterpillars affected by this disease become watery and limp. The caterpillars are nearly mature at this time (July 1) and will soon be leaving the trees to pupate in the soil. A few moths have started to emerge from the pupae that ordinarily would have emerged last year. It is not yet known whether they will be numerous enough to start a serious second brood.

Pandora moth outbreak in ponderosa pine near Black Hills.--J. A. Beal reports that an outbreak of the pandora moth in ponderosa pine, dangerously close to the Black Hills area, has recently been called to the attention of the Fort Collins laboratory. Specimens of the moths, eggs, and newly hatched larvae have been collected and forwarded to the laboratory by R. A. Phillips, area forester of the Soil Conservation Service, and by Supervisor E. A. Snow, and Ranger Russel Smith, of the Harney National Forest. The area lies from 8 to 10 miles northwest of Osage, Wyo., and there is estimated to be about 2,000 acres of heavily defoliated pine. Moths are flying now but are becoming scarcer and their dead bodies litter the ground. Newly laid eggs occur thickly on the foliage over a wide area and some of the young larvae are beginning to hatch. A few living pupae can still be found in the ground. Residents of Newcastle, Wyo., report that last summer thousands of the moths were seen flying around the street lights in the city. This would indicate that there might have been a flight of moths last year, as well as this year, although no 2-year-old larvae have yet been found. The outbreak is about 25 miles west of the Harney and Black Hills National Forest boundaries and there are continuous stands of ponderosa pine timber connecting the area and these forests.

Notes on European spruce sawfly.--P. B. Dowden and W. F. Sellers, of the New Haven, Conn., laboratory, report as follows on the progress of European spruce sawfly studies in the town of Marlboro in southern Vermont: "Thirty-six cloth-bottomed trays measuring 3 by 3 feet were placed in a 1/5-acre plot to note feeding and larval mortality. About 2,600 dead sawfly adults were collected on these trays. The trays have been cleaned daily and, although there is a tremendous larval population in the plot and frass from feeding larvae is very abundant, there has been very little larval mortality as yet. On June 30 most of the larvae were in the fourth instar, although fifth-instar larvae and earlier stages were common. Thirty-six similar trays were also placed in a second (permanent) observation plot at Marlboro, but the larval population there is apparently insignificant. At least very little frass and almost no larvae have fallen on the trays. On June 23, 12 of these trays were moved to a third location in south Marlboro, where there is a low

sawfly population at present. If the infestation moves eastward and southward, as it has up to the present time, this third plot should be infested more heavily later in the season. Forty trees severely defoliated for the first time in 1938 were noted and numbered last fall. Recent examination of these trees showed 10 of them apparently dead. Two of those trees have green tops, but are badly infested by bark beetles. A similar tree was cut and is being held caged to rear bark-beetle adults."

Bark-beetle population light in salvaged logs in hurricane area.--J. V. Schaffner, Jr., New Haven, reports that white pine logs salvaged in the hurricane area and stored on dry sites were examined at several localities in Massachusetts in June. Although bark beetles were more commonly found than in May, the percentage of infested logs is still exceedingly low. Light attacks of ambrosia beetles were found in one or two logs on dry sites at Dover, Dunstable, and Petersham, Mass. At Petersham larvae of Dendroctonus, probably D. valens, beneath bark which was fully exposed to the sun were found to be dead, while larvae beneath bark on the lower, shaded side of logs were alive. A few full-grown larvae, tentatively identified as Pissodes approximatus Hopk., were found in cells beneath the bark of white pine logs. No adults or larvae of cerambycids have been found.

Sawfly on red pine in Massachusetts decreasing.--Mr. Schaffner further reports that few severe infestations of the sawfly "Neodiprion sp. on red pine" were observed this year, although feeding was noticeable on individual trees and groups of trees in many plantations in eastern Massachusetts. Many larvae died, apparently from disease, before becoming full grown.

Larvae of European pine shoot moth may not migrate.--Observations by S. F. Potts indicate that half-grown larvae of the European pine shoot moth are seldom able to migrate successfully from one shoot to another, although they may readily go from one bud to another on the same shoot. This seems to indicate that few if any larvae reach maturity on the shoots of the lower branches, which have only one small bud per shoot, while the chances for survival are much greater on shoots near the upper part of the crown having more than one bud per shoot.

Elm bark beetles fail to infest other hosts in laboratory tests.--The larger European elm bark beetle (Scolytus scolytus F.), the smaller elm bark beetle (S. multistriatus Marsh.), and the native elm bark beetle (Hylurgopinus rufipes Eich.), have been recorded in literature as reproducing on a number of host plants. C. H. Hoffmann, of the Morristown, N. J., laboratory, reports that sections of American and European linden were subjected to attack by adults of S. multistriatus and H. rufipes in a screened cage and also under natural conditions in the field. Both species bored, perhaps fed, in the bark but only a few contacts with the wood surface were noted and no galleries were attempted. D. E. Parker, during his studies of elm insects in England, subjected sections of wild cherry, wild plum, ash, and willow to adults of both S. scolytus and S. multistriatus. Only a few attempts to bore into the bark were made by either species and no gallery formation was attempted.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

New gypsy moth infestation discovered in Vermont.--During the early part of the month a gypsy moth infestation was located in Lincoln, Addison County, Vt., the first ever to have been found in this township.

Sprayers kept in good condition by field mechanics.--Visiting mechanics were responsible, to a great extent, for the smooth operation of spray pumps, because these employees worked on a carefully planned schedule so that every machine was visited at least once a day; and, in a great many instances, twice daily.

Collection of gypsy moth egg clusters for hatching records.--During the spring of 1938, and again during the spring of 1939, C. C. C. foremen collected gypsy moth egg clusters for hatching records. These egg clusters were brought to Greenfield, where the records were obtained. In 1938, 115 egg clusters were collected from 12 different towns and these showed approximately 76-percent hatch; whereas in 1939, 120 egg clusters were collected from 22 towns and these gave an 80-percent hatch.

Weather conditions favorable to spraying.--During the period June 5 to 10, excellent weather conditions permitted uninterrupted spraying in all sections in which this type of work was performed. The days were hot and sunny so that the spray solution dried onto the foliage very quickly.

Ski trails an aid to scouting work in Vermont.--Scouting crews working on the eastern slopes of Mount Mansfield, which lies partly in the township of Stowe, Lamoille County, found the numerous ski trails very useful to walk over in reaching remote sections of extensive tracts of forest land. These trails, which are well defined, are of much help in subdividing the woodland into sections that may be more easily scouted.

Use of small-diameter hose aids in spraying work.--The use of about 300 feet of light, small-diameter hose, directly behind the nozzle, facilitated handling of the hose line and the nozzle, particularly in woodland tracts where the ground was rough and the growth was dense.

Heavy defoliation on woodland growth at Shelburne Falls, Mass.--It was observed during the latter part of the month that a large hillside in this town had from 50 to 100 percent defoliation of woodland growth caused by forest tent and gypsy moth caterpillars. An examination of part of the area showed that most of this defoliation had been caused by tent caterpillars, although a sufficient number of gypsy moth caterpillars were present to cause noticeable defoliation.

Seasonal jobs take many W. P. A. workers in Vermont.--The force of W. P. A. gypsy moth workers in northern Vermont has been dwindling steadily since early in May. Most of these men have resigned to take up seasonal employment, such as farm and mill jobs, work in mines; a few to undertake private enterprises; and a large number obtained employment on road work and other types of construction. It is anticipated that the approaching haying season will take still more from this project.

Few forest tent caterpillars killed by spray.--Observations by field employees in Connecticut indicate that in the areas sprayed for the gypsy moth there is little evidence of killing of forest tent caterpillars, because this insect had ceased feeding before the spray was applied.

Converted sprayers prove to be efficient.--The converted sprayers assembled in part from salvaged parts taken from the old Federal sprayers have proved highly satisfactory. During the last 2 years the gypsy moth project has converted 20 of the obsolete type at the Greenfield, Mass., repair shop. These self-powered units, readily mounted on a $1\frac{1}{2}$ ton truck chassis, may be placed at set-ups along streams and water holes inaccessible to the cumbersome types of sprayers formerly in general use.

Control measures in Granby-Simsbury-Canton area found to be effective.--The creosoting and thinning work performed in this area has resulted in greatly reducing the spread of small caterpillars this spring; therefore the areas that have been sprayed will be in very much better condition in the immediate future.

Theft of hose couplings.--Early in the month a report was received from Pennsylvania to the effect that hose couplings had been cut off from some 18 lengths of spray hose which had been piled in a woodland at a location where spraying was under way. Some of them were recovered at a junk yard after investigation by the local police.

Progress of gypsy moth spraying work.--During May foliage development was slow, because of the late season, and as the end of the month approached, it appeared that it would be necessary to delay the spraying, as leaves would not be sufficiently developed to hold the spray well. However, during the last week of the month the foliage developed rapidly and it was possible to begin spraying on June 1 at many places in New England and Pennsylvania. Thirteen spraying machines were started in Massachusetts, 12 in Connecticut, and 35 in Pennsylvania. Later an additional machine was placed in commission in Massachusetts. Of the 12 machines assigned to Connecticut, 7 were operated for a considerable period on the double-shift basis and in Pennsylvania 22 were thus operated. By this arrangement, whereby each machine is operated by 2 crews working consecutively on 6-hour shifts, 12 hours of spraying each day can be accomplished, in contrast to the usual 8-hour performance for those operating under the single-shift arrangement. A considerable number of sections selected for spraying were a long distance from possible sprayer set-ups, necessitating the laying of long hose lines. This, coupled with the fact that the supply of hose was quite limited, made it necessary to delay spraying in some of them until hose could be transferred from other sections which were partially completed. Spraying work progressed very satisfactorily as a whole. The supply of arsenate of lead was less than was needed to cover all of the area selected for spraying, therefore not all of the spraying machines available were used during the entire season. In the Pennsylvania infested area, because of this shortage, spraying had to be discontinued before the end of June. Owing to a rather continued absence of rain prior to and during the spraying season, many of the streams which usually provide an adequate water supply dried up so that it became necessary to change sprayer set-ups and to shift hose lines. Notwithstanding difficulties, more than 11,000 acres of woodland were sprayed in

Vermont, Massachusetts, Connecticut, and Pennsylvania. All spraying work had to be discontinued in June before the end of the month to avoid having the W. P. A. employees exceed the number of hours allowed in their employment schedules. Most of the spraying was discontinued about June 20 so that sufficient time could be allowed to assemble and store spraying materials and equipment before the end of the working period for the month.

PLANT DISEASE CONTROL

Survey completed on 955 square miles in Minnesota.--L. W. Melander, in charge of barberry eradication in Minnesota, reports that Federal and State W. P. A. crews have made an intensive survey of 955 square miles in central Minnesota counties since January 1. The following table summarizes the results of this work.

County	Area	New	Bushes and seedlings	
	: covered	: properties	: Planted	: Escaped
	: Sq. mi.	: Number	: Number	: Number
Carver-----	124-1/3	10	--	125
Rice-----	274-1/4	25	8	65
Scott-----	125-1/2	11	4	120
Sherburne---	22-1/4	3	--	34
Washington---	29-1/2	--	4	530
Winona-----	101-1/8	3	--	5
Wright-----	252-1/4	20	25	830
	:	:	:	:
Miscellaneous:	:	:	:	:
Brown-----	--	1	1	--
Dakota-----	--	1	--	1
Goodhue-----	--	1	1	--
Sibley-----	16-1/2	--	--	--
Total-----	945-17/24:	75	43	1,710

Berberis canadensis found in Shannon County, Mo.--George M. Frandsen, barberry-eradication leader in Missouri, reports having made an investigation of an area infested with Berberis canadensis in Shannon County. This species of barberry is found only occasionally in Midwestern States. A description of the area is as follows: Shannon County is in southwestern Missouri and the point at which Berberis canadensis bushes were found is about $2\frac{1}{2}$ miles east of the point where Howell, Shannon, and Texas Counties join. The area was not extensive. Plants were found growing near the top of Jam Up Bluff. Only a few hundred plants, many of them 12 to 15 inches in height, were found. The tallest did not exceed 4 feet in height. Mr. Frandsen examined this area on April 21 but reported that leaves were just appearing and no rust infection was present.

W. P. A. labor destroys 53,000 barberry bushes in Iowa.--Control work accomplished with W. P. A. crews in Iowa during the last 4 years may be briefly summarized as follows: D. R. Shepherd, State leader in Iowa, reports that an intensive survey has been completed in an area comprising 22,900 square miles in 52 counties. This work has resulted in the eradication of more than 53,000 rust-susceptible barberry bushes on 2,277 different properties. According to Mr. Shepherd, much of the work done by

W. P. A. laborers during this period has been in those parts of the State where the rough topography, heavy timber, and dense undergrowth had made survey with smaller crews in years past impracticable and ineffective. In conjunction with the regular survey, 2,708 properties from which bushes had been previously removed, were reinspected. Barberry bushes were found on 21 percent of them.

Interbureau cooperation on blister rust training program.--In order better to equip regular Forest Service personnel, all temporary blister rust supervisors and the C. C. C., W. P. A., and regular blister rust workers for their season's work, the Forest Service and the Bureau of Entomology and Plant Quarantine conducted a program of intensive training and schooling in blister rust and its control during the latter part of May and the early part of June in the western white pine region. An illustrated lecture, with colored lantern slides, was given in each camp. Supplementing this are bulletins and manuals that give more complete information, field inspections of the rust on pine and Ribes, and training in control work.

More than 10,000 employees engaged in control of grain rust and white pine blister rust.--On June 14, relief employment on the Federal blister rust control project reached 5,022, the highest level since October 1936, according to reports from the regional leaders. The number of employees on emergency funds in the Division of Plant Disease Control totaled 7,584 in the Federal barberry-eradication and blister rust control projects during that week. There was a moderate increase later in the month, but a falling off is anticipated by the end of July in response to a reduction in appropriations. Several thousand additional laborers paid by cooperating organizations, State W. P. A. projects, and C. C. C. camps are also working on the control of grain rust and of white pine blister rust, therefore the Division is supervising over 10,000 men on the 2 projects this summer.

H. M. Cowling cooperates in aerial mapping.--Assisting in a Forest Service, A. A. A., and S. C. S. cooperative aerial mapping project in eastern Oregon, H. M. Cowling, regional blister rust photographer who is an experienced aerial photographer with the 116th Observation Squadron, Washington National Guard, reports that 1,000 square miles were photographed in 4 flying days. The major purpose of this work is to develop a complete and accurate map of the Umatilla and Malheur National Forests and the adjacent territory. Flying at 18,000 feet elevation, the area is stripped, each strip yielding a series of pictures with each overlapping the next by 60 percent. Adjacent strip overlay is about 30 percent. This method gives fine mapping detail when only the center of a picture showing a 2 by 3 mile area is used. The pictures are taken with a 42-pound camera on film rolls that produce 110 pictures 7 by 9 inches each. Working in heavy wool-lined flying suits at a temperature of 8° above zero, with mental facilities somewhat sluggish notwithstanding constant intake of oxygen from tanks, a full day's work is 7 hours in the air. Owing to the lack of darkroom facilities in the ship for reloading film magazines, the maximum day's production was 3 rolls.

Methods-development work in sugar pine region.--Methods-development work was carried on during May on the Sierra and Plumas National Forests.

On the Sierra Forest this work included eradication of Ribes cereum and R. roezli by means of the horse-drawn plow, eradication of large and troublesome R. roezli, R. cereum, and R. nevadense bushes by blasting with 20 percent and 25 percent dynamite, and testing and demonstrating the new pronged mattock for work on R. roezli. On the Plumas National Forest the regular bulldozer was tested in upland type for the eradication of R. roezli. These tests were made in heavy brush along abandoned railroad rights-of-way and in upland grassy areas. The bulldozer, although not of the type essentially designed for work in upland areas, did satisfactory work under all conditions tested. Observations showed that a small unit, probably one of the caterpillar D-2 type bulldozers, equipped with a hoisting winch from which a cable and several tag lines could be operated, would be well adapted to work in upland areas.

Pine disease survey in western white pine region.--A pine disease survey carried on during May on the Mount Spokane and Couer d'Alene operations showed the following results:

Operation	Drainage	Chains	White pine			Cankers	
			Ex- amined	In- fected	In- fected	Total	Per 100 trees
		Number	Number	Number	Percent	Number	Number
Mt. Spokane---	Spirit Creek						
	and Fish Creek	3,073	24,406	401	1.6	1,018	4.2
Coeur d'Alene--	Scott Creek						
	and Silver Creek	165	1,868	1,105	59.1	11,956	640.0

Although the percentage of infection on the Idaho side of the Mount Spokane Operation is quite small when an average is taken for all of the Spirit Creek drainage, very heavy spots of infection were found in certain townships. As the Fish Creek area represented an older and more dense type than that found on Spirit Creek, only stream scouting was performed there. Only one small spot of infection was found. In view of the high percentage of infection on the Scott-Silver Creek area on the Coeur d'Alene operation, and the extremely high canker count, which represents a high damage rate on the very small trees found, it was deemed impracticable to control the rust on this area.

Uredinial stage of blister rust reported in New England States.--State Leader Perry of Massachusetts reports having found the first evidence of the uredinial stage of blister rust for the 1939 season on Ribes cynosbati in Shelburne, Mass., on June 7. Alton Miller, of Connecticut, reports having found first uredinia on June 2 in Goshen.

COTTON INSECT INVESTIGATIONS

Cotton-insect laboratory established at Waco, Tex.--A laboratory of the division was established at Waco, Tex., when K. P. Ewing was transferred from Port Lavaca to Waco on March 23. R. W. Moreland was transferred from College Station, Tex., on June 13 and P. A. Glick from Tifton, Ga., on June 16. The Waco laboratory will be field headquarters for cotton

flea hopper and bollworm investigations. Since 1933 most of the flea hopper investigations have been conducted at Port Lavaca and that for this year will continue as a seasonal sublaboratory of the Waco laboratory. Most of the bollworm investigations have been conducted at College Station, in cooperation with the Texas Agricultural Experiment Station. The experiment station will continue these investigations but most of the Bureau's investigations relating to the bollworm will be conducted from the Waco laboratory. The laboratory is located on U. S. Highway No. 77 adjoining the Circle on the southern edge of Waco. The Bureau has leased 3 acres of land, an office and laboratory building, a garage, and a warehouse, and has erected an insectary. The insectary was completed on May 31. The other buildings were accepted on June 7. The laboratory also has two rooms in the Post Office Building, which will be used in connection with a cooperative project with the Soil Conservation Service at their Blacklands Experimental Watershed. This project is a study of the relation of soil conservation practices to cotton-insect populations. Special consideration will be given to the cotton flea hopper and the bollworm, but studies will also be made of the boll weevil, leaf worm, thrips, aphids, cutworms, and other insects.

Cotton root aphids.--Experiments on control of the cotton root aphids have been reported upon by F. F. Bondy and C. F. Rainwater, of Florence, S. C. Three species of aphids, Anuraphis maidi-radicis (Forbes), Rhopalosiphum subterraneum Mason, and Trifidaphis phaseoli Pass., were present, either singly or in combination, on the roots. Where T. phaseoli was present the damage to cotton was always severe but where only the other two species were present the damage was usually light. Cotton on land following corn or watermelons and peas, was again much more seriously attacked by root aphids than when following cotton, tobacco, or small grains. Cowpeas or soybeans are usually interplanted with corn, and serve as late host plants for the aphids, especially T. phaseoli. Where legumes are not planted in the corn there is usually a heavy growth of weed hosts, whereas cotton and tobacco are more cleanly cultivated late in the season. In some fields the degrees of damage following different crops could be noted to the exact row. Attempts to control the aphids were by applying (1) repellents for the attendant cornfield ants (Lasius sp.) to the soil before planting; (2) repellents for ants to the soil after planting and the aphid infestation had developed; (3) poisons for the ants; (4) soil fumigants for aphids and ants. The repellents used before planting were mixed with bone meal and those after planting with ground tobacco stems, as carriers. The repellents tested were kerosene, 1 quart; oil of sassafras, $\frac{1}{4}$ pint; oil of anise, $\frac{1}{4}$ pint; oil of tansy, $\frac{1}{8}$ pint; oil of lemon, $\frac{1}{4}$ pint; tincture of asafetida, $\frac{1}{4}$ pint. These were mixed with small amounts of alcohol or water, 10 pounds of each of the carriers, and applied to 1/80-acre plots. The effects of the repellents were measured by the number of ant hills around the plants, although this did not prove entirely satisfactory because some were destroyed by cultivation. None of the repellents applied either before or after planting were effective. Tincture of asafetida was better than the others. The ant poisons used were varying quantities of thallium sulphate, thallium acetate, and tartar emetic in sweetened baits, made with sugar and honey, or sugar and sirup. The poisons were exposed by absorbing on strips of blotting paper and placing the strips on the surface of the soil and in

perforated tin cans, and on sponges placed in cans. When the strips containing poison were exposed on the surface of the ground the ants began to feed immediately and in about 5 minutes the strips were covered with ants, whereas it was about 30 minutes before they began to feed on the strips or sponges in the tins. The strips placed on the ground dried out rapidly, soon became covered with dirt, and were ineffective after a short time. With tartar emetic, however, only a short time was required for the poison to be effective, and after 12 hours no ants, either dead or alive, could be found around the strips or in the ground around the plants. Presumably they died in their nests, which were deeper in the soil than the plants. Tartar emetic was more effective than either of the other two poisons and was equally as effective when 2 ounces were mixed with 1 gallon of water, 1 pound of sugar, and 2 ounces of honey as when mixed with 1 quart of water, $\frac{1}{2}$ pound of sugar, and 1 ounce of honey. Thallium acetate appeared to be slightly more effective than thallium sulphate. Both were more effective when 100 grains were used with 1 pound of sugar, 3 ounces of honey, and 1 pint of water, than at weaker concentrations. More species of ants were attracted to the thallium poisons than to the tartar emetic, probably because of the higher concentrations of sweets than in the tartar emetic formulae. Apparently a high concentration of sweets is not necessary to attract the cornfield ant. The soil fumigants used were ethylene dichloride and dichlorethyl ether, emulsified with fish-oil soap and water. From 1 to 3 pints of ethylene dichloride, a pint of fish-oil soap, and 6-8 pints of water made excellent emulsions, but from 10 to 40 cc. of dichlorethyl ether with 1 pint of soap and 9 pints of water did not emulsify satisfactorily. Both emulsions were applied in a solid stream to the soil at the base of the plants with a knapsack sprayer at the rate of approximately 40 gallons per acre. Neither of the materials had any apparent ill effect on the cotton when applied to the soil but both caused burning when applied to the leaves. Also neither material, at the strengths used, was effective in controlling the ants or the aphids. There seems to be a relationship between the presence of root aphids, particularly T. phaseoli, and diseases of cotton seedlings. Stunted or dead plants showing lesions indicative of a disease nearly always have T. phaseoli present and the areas in which the disease is most prevalent are also the areas where the root aphids are most abundant.

Adults of false wireworm Eleodes sp. controlled by poison bran mash.--

On May 23 the Bureau was informed that beetles were destroying young cotton plants on several farms near Vancourt, Tom Green County, Tex. Under date of May 26, R. R. Reppert, extension entomologist, College Station, Tex., reported that the insects destroying the cotton in Tom Green County were adults of Eleodes sp. W. I. Marschall, county agent, San Angelo, Tex., reported that C. S. Callahan, of Vancourt, who was threatened with the loss of his cotton crop because of the beetles, "was enthusiastic about the results of the poison-bran-mash formula in the control of these beetles." He stated that this insect appeared to be very fond of the poisoned bran. He noted that during the first 24 hours after the distribution of the mash the mortality among the beetles was not high but that the beetles were still taking the poison the third day after it was applied. An examination of the field at that time showed as many as 20 dead beetles on the ground under 1 weed. On a space less than 12 inches square there were 8 dead beetles. Mr. Callahan used 400 pounds of bran mash on 80 acres of ground. He poisoned 4 rows and skipped 2, and is of the opinion that the poison can be placed more thinly, as it seems to attract the insects. He states that this is the easiest insect

pest to destroy that he has ever worked with in his experience as a farmer. The poison-bran-mash formula used calls for slightly more sirup than generally used in making the poison for grasshopper control.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Inspection in the lower Rio Grande Valley.---In this semitropical area of Texas, designated as the lower Rio Grande Valley district, which has been under regulation on account of pink bollworm infestation since 1936, cotton is usually planted during the latter part of January and February and the harvesting of the crop is, as a rule, completed about the latter part of August. The 1939 cotton season in this valley was opened with the ginning of the first bale on June 11 from Starr County. On June 30, 55 gins were in operation and had produced 709 bales of cotton. Bloom inspection, which was begun on the first of May, to determine the degree of pink bollworm infestation in that district, was continued on into June. As reported last month, a rather heavy infestation was found in the Brownsville area, which was known to be infested last season. Picking of all rosette blooms in the 2 most heavily infested fields--the A. Leal and the Lozano Banco--was discontinued on June 20, as it was believed the green bolls in those fields had reached the stage where they were more attractive to the pink bollworm than the blooms. During the period June 1 to 20, a total of 1,072 specimens were taken from blooms in these 2 fields, making a grand total of 1,836 specimens of the pink bollworm taken from those 2 farms since May 1. Additional bloom inspections were made in Cameron County in June in the immediate vicinity and adjacent to the 2 heavily infested fields. A total of 266,916 blooms were examined from 24 fields. One additional infestation was discovered on June 16, from a field located 1/2 mile south of Brownsville, bringing the total number of known infested fields in Cameron County to 12, 9 miscellaneous infested fields, in addition to the 2 heavily infested ones, having been found in May. These findings indicated that a much heavier pink bollworm infestation existed in Cameron County in the 1939 crop than was present during the last season. On June 2 a casual inspection of green bolls in the Leal and Lozano fields resulted in the finding of 4 first-instar larvae. This was the first green-boll infestation to be reported this season. On June 8, 100 green bolls were collected from each of 9 known infested fields to determine the percentage of green-boll infestation. Seven of these fields showed no infestation, while 1 showed a 1-percent infestation, and the Leal field, known to be the most heavily infested, showed a 6-percent infestation. Early in June the A. Leal and Lozano Banco fields were declared a public menace by the Governor of Texas, and it was the intention of the State to purchase the cotton crop on those fields with existing funds and destroy it. On June 20 the Attorney General rendered an opinion to the effect that previously appropriated funds could not be used by the State for the purchase of this cotton; hence, these fields were not destroyed.

Conditions in the Big Bend.---Activities in connection with the 2-year program in the Presidio section of the Big Bend of Texas, carried on in an effort to reduce the heavy pink bollworm infestation in that area, were brought to a conclusion at the end of May. Similar control measures practiced by the Mexican Department of Agriculture in the Ojinaga region across the Rio Grande from Presidio were completed about June 10. This program consisted of the early harvesting of the 1938 cotton crop, followed immediately

thereafter by the cleaning of fields, with a delayed planting date for the 1939 cotton crop and the destruction of all stub or volunteer cotton, in order to create a starvation period for all pink bollworms emerging prior to the fruiting of the main cotton crop. It is believed that practically all moth emergence was over in that area by June 8, and no blooms were found in cotton before June 17, thus creating a long period of suicidal emergence. Results of inspection of material from the 1939 cotton crop in both the Presidio and Ojinaga areas of the Big Bend are therefore awaited with much interest, in order to determine the effectiveness of these measures in reducing the heavy infestation in that region.

The situation in Arizona.--The general condition of the cotton crop in Pinal and Pima Counties, and that part of Maricopa County affected by the control program, which was brought to a close on May 31, looks very favorable for good results to be realized from our efforts to eradicate the pink bollworm from that area. The maturity of the cotton crop was held back through volunteer cooperation by the farmers, either by delayed planting, withholding water, or both, and, with the exception of a few scattered spots, all stub cotton was eliminated from the areas affected. It is not believed that there was sufficient cotton in fruit in Maricopa and Pinal Counties to propagate the pink bollworm before June 20. In both of these counties, within a distance of 14 miles of known infested spots, all volunteer plants were destroyed before reaching the fruiting stage, which has undoubtedly created a starvation period for emerging pink bollworm moths over several months' duration, and should bring about a marked reduction in infestation in the 1939 crop. In that part of Maricopa County not included in the control program, cotton was rather heavily fruited at the end of the month, with some of the earlier planted fields showing almost full-grown bolls. South of the Salt River, open bolls had been found before the close of June in stub cotton located just west of the Tempe Branch of the Southern Pacific Railroad, an area not affected by the control program and considered the boundary line of the known infested area. This is in striking contrast to nearby fields, lying within the regulated area, which had just begun to show squares and blooms at the end of June. Thus the comparison affords a good idea of the importance of the measures carried out in the spring activities.

Wild-cotton-eradication work in southern Florida.--Wild-cotton-eradication work has been carried on each season in southern Florida since the discovery of the pink bollworm in that area in 1932. The wild cotton plant provides a host for the pink bollworm and it is essential that it be eradicated so as to deprive this insect of material on which to propagate, and thus prevent its spread to commercial cotton plantings in northern Florida and southern Georgia and on into the main Cotton Belt. Funds to carry on this activity are provided for by the Work Projects Administration, together with funds allotted by this Bureau. No work is attempted in that area during the summer months because of climatic conditions, and this program was brought to a close on June 9. At this time only W. P. A. labor was being used. During the last days of the work a hurried check-up was made on some of the most difficult colonies. For the most part only very small seedling plants were found, these having sprung up since the rainy season started. However, in the Key Largo section 113 fruiting plants were found and destroyed during the period worked in June. Only 18 additional fruiting plants were

found in the remainder of the entire district. Approximately 1,422 acres was recleaned and 14,824 seedling plants were destroyed during the portion of the month worked.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Cryolite controls hornworms on cigar-binder tobacco.--Tests conducted by F. S. Chamberlin and A. H. Madden, of the Quincy, Fla., laboratory, to determine the relative toxicity of cryolite and a paris green-lime (1-6) mixture to the hornworms Protoparce sexta (Johan.) and P. quinquemaculata (Haw.), on cigar-binder tobacco, demonstrated that cryolite-dust mixture applied to plots of cigar-binder tobacco throughout the infestation period of approximately 7 weeks exerted a more effective control of hornworms than did the standard paris green-lime mixture; that cryolite caused only the slightest traces of foliage burning, whereas the paris green-lime mixture damaged the leaves appreciably; and the cryolite washed readily from the foliage and apparently will cause little objectionable discoloration on the cured product. In view of the particular use to which cigar-binder tobacco is put, the results obtained in these tests indicate that cryolite offers a more satisfactory control of hornworms on this type of tobacco than does the standard paris green-lime mixture. It was noted, however, during the course of these tests, that the physical character of the cryolite must be improved before it can be used successfully in the dust form by growers in the Florida tobacco-producing area.

Relative toxicity experiments against cabbage caterpillars.--C. E. Smith, of the Baton Rouge, La., laboratory, and W. J. Reid, of the Charleston, S. C., laboratory, conducted tests against the three common species of cabbage caterpillars--the imported cabbage worm, the cabbage looper, and the diamondback moth--using four insecticides, i. e., pyrethrum-talc (1-2); derris-dust mixtures containing 0.5 and 1.0 percent of rotenone, respectively; and a combination of derris-pyrethrum (0.5 percent rotenone and 0.2 percent total pyrethrins), applied at 7-, 10-, and 14-day intervals. The results indicated that pyrethrum was more effective than derris for the cabbage looper, while the reverse was true for the other two species. The combination of derris and pyrethrum was most satisfactory for the three species as a whole, and resulted in the best yields. While no differences could be detected between the 7-day and 10-day applications, it was demonstrated that both were decidedly more effective than the 14-day applications.

Strawberry weevil feeds on wide range of wild host plants.--In investigations conducted on the Eastern Shore of Maryland during the spring and early summer of 1939 by W. A. Thomas, of the Chadbourn, N. C., laboratory, it was found that the new generation of Anthonomus signatus Say began emerging from the pupal stage during the last week of May. These early individuals began feeding heavily on the flowers of wild cherry, blackberry, dewberry, and yellow cinquefoil. During the third week of June, near the peak of emergence, the weevils were observed feeding heavily on the flowers of wild rose, elderberry, wild carrot, and yarrow, or milfoil. They were taken from an unidentified water plant in large numbers near Willard, Md. They were also taken in smaller numbers from a species of late-blooming huckleberry, milkweed, white elder, sumac, and a single specimen from a species of laurel. The members of the new generation of weevils were still abundant in the strawberry fields, where they were observed on the strawberry foliage, but there were no indications that they were feeding on it.

Wireworms in Pacific Northwest fail to reproduce parthenogenetically.--Tests conducted by M. C. Lane, of the Walla Walla, Wash., laboratory, with 260 female beetles of Limonius canus Lec., and 50 of L. californicus Mann., demonstrated that, although 77 percent of the former and 32 percent of the latter species laid eggs, none of these hatched, which indicates that the possibility of parthenogenesis in the females of either species is very slight. It is interesting to note in these tests that the unmated females lay relatively small numbers of eggs, most of them only from 5 to 10.

Oregon pea growers sweep fields in pea weevil control program.--J. C. Chamberlin, of the Corvallis, Oreg., laboratory, reports that 73 growers of Austrian winter field peas, representing 2,424 acres, attended sweeping demonstrations, sponsored by County Agent W. F. Cyrus, of Washington County, to receive instructions on how to check their fields for pea weevil infestations in order to determine the necessity for and the extent to which a given field should be dusted. These demonstrations were held at 4 localities in the county. Most of the growers later obtained insect nets and swept their own fields, both as a guide to dusting operations and as a check on results. Many of these growers volunteered to keep records of their observations and to turn over duplicates to Bureau workers.

Glycerine and tartar emetic effective against red spider.--In laboratory tests conducted by C. A. Weigel and G. V. Johnson, of the Beltsville, Md., laboratory, against Tetranychus telarius (L.) on chrysanthemum cuttings, it was shown that glycerine and tartar emetic gave a mortality equal to that obtained with brown sugar and tartar emetic. Other materials substituted for brown sugar, including sodium oleyl sulphate, sodium oleyl sulphate plus synthetic resins, and sodium lauryl sulphate, as well as a proprietary compound containing derris, lethane, pine oil, petroleum, and an emulsifier, resulted in much lower mortalities.

INSECTS AFFECTING MAN AND ANIMALS

Effectiveness of derris washes on cattle grubs.--Results of experiments conducted by R. W. Wells and H. O. Schroeder, on the control of cattle grubs, indicate that derris washes consisting of 8 and 12 ounces of derris to the gallon of water, plus 4 ounces of soap, applied at the rate of 1/3 quart per animal, are less toxic to Hypoderma bovis (Deg.) than to Hypoderma lineatum (De Vill.). In the former species the third-instar larvae were more resistant to the washes than were the second instar, while with the latter species the reverse is the case. Hand rubbing of the backs of the animals after the application of the insecticide is more effective in killing H. lineata larvae than brush rubbing, but in treating animals infested with H. bovis, brush rubbing is just as effective as hand rubbing.

Resistance of American dog tick to derris dips.--C. N. Smith reporting on laboratory tests with derris powder dips (derris 2 ounces, water 1 gallon, and soap or other wetting agent 1 ounce), states that used against the adult ticks none of the mixtures will kill the inactive stages; 16 percent of the females and 33 percent of the males active but unfed in nature were killed; 92 percent of fed males and slightly engorged and fully engorged females were killed, as were 44 percent of females one-eighth to one-third engorged, and 50 percent of the females one-half engorged.

Home-made pyrethrum livestock spray.--Craig Eagleson, of the Dallas, Tex., laboratory, reports that a home-made pyrethrum livestock spray containing 100 milligrams pyrethrins per 100 cc. can be prepared by using 20-to-1 commercial concentrated pyrethrum extract diluted with high grade kerosene at a cost of 34 cents per gallon. This spray is fully as toxic to flies attacking livestock as commercial pyrethrum sprays of the same pyrethrin content, which cost approximately twice the amount.

Large quantities of Chaoborus caught in traps.--A. W. Lindquist, of the Nice, Calif., laboratory, reports that with a new type electric light suction trap devised at his station as high as 75 quarts, or 32 pounds, of Clear Lake gnats were caught in a single 3-hour collecting period.

Gambusia control larvae of Aedes aegypti in plant-nutrient solutions.--With the rapidly increasing use of nutrient solutions for plant culture, the problem has arisen of how to prevent mosquito breeding in such solutions. Because of the likelihood that the chemical might adversely affect the plants, it does not seem advisable to use these materials until more data are available regarding their effect on the nutrient solutions. G. H. Bradley and B. V. Travis, of the New Smyrna, Fla., laboratory, have found, however, that top minnows (Gambusia spp.) will apparently thrive in a solution used for growing tomatoes and will keep the solution free of Aedes aegypti larvae. The small fish would doubtless be equally effective in destroying other species of larvae.

FOREIGN PLANT QUARANTINES

Fruitfly larvae in baggage arrive from Mexico by airplane.--On June 11, 1939, a basket containing 45 figs, 12 sapotes, and 12 mangoes was intercepted in passenger's baggage from Mexico City at the Brownsville airport. The owner, a former Spanish diplomat, was very reluctant to relinquish the fruit, stating that he had picked it himself and he could not see how any harm could result from its importation. When the fruit was examined, 113 larvae of Anastrepha serpentina Wied. were taken from 11 of the sapotes. The twelfth sapote showed evidence of previous infestation.

Stopping them at the line.--Recently an automobile bearing a California license and pulling a large house trailer arrived on the bridge at Laredo. When asked if they had any fruits or plants from Mexico, the occupants of the car replied, "Only a few potatoes in the trailer." These were then turned over to the inspector. A thorough search of the trailer, however, brought to light seven apples and three oranges which had been concealed by the owners. A fine of \$1 was assessed by Customs for petty smuggling. On May 15 a Mexican from Weslaco, Tex., was apprehended at the port of Hidalgo by Inspector A. L. Williamson as he was attempting to smuggle 30 plants into the United States from Mexico. The plants were confiscated and Customs assessed a fine of \$10 for petty smuggling.

Bacterial disease of potatoes in South America.--Roberto Millan, of Argentina, while in the United States will study the ring rot disease (Bacterium sepedonicum Spieck.) which has recently been found affecting potatoes in several States, in an effort to determine whether or not it is the same disease that has recently been found on potatoes in Argentina. A. S. Muller,

of Venezuela, who was in Washington the last of June, states that a new bacterial disease of potatoes has recently been found in Venezuela. It is hoped that he and Mr. Millan and potato pathologists in this country will be able to determine the identity of the South American disease or diseases. Argentina and Venezuela obtain seed potatoes from this country and Canada, hence both pathologists are interested in potato-disease conditions in the areas producing potatoes that may be exported to their respective countries.

Entomological interceptions of interest.---Two living larvae of the Mexican fruitfly (Anastrepha ludens Loew) were intercepted at Laredo, Tex., on April 12 in a ponderosa lemon in baggage from Mexico. Two living larvae of the cerambycid Cyllene antennatus White arrived at Brownsville, Tex., on February 13 in mesquite wood in cargo from Mexico. Specimens of the scale insect Chionaspis euphorbiae Brain were found at Washington, D. C., on October 5, 1938, on Euphorbia triangularis in the mail from the Union of South Africa. A living specimen of the cydnid Geocnethus lugubris (Stal) was intercepted at San Francisco on February 1 on an orchid (Cattleya trianae) in cargo from Colombia. A living larva of the pyralidid Syngania abruptalis (Walk.) was collected on November 17, 1938, on Ageratum in the field at Dedado, Guam. A living adult of the chrysomelid Pagria signata (Mots.) arrived at Seattle, Wash., on February 24 with sphagnum moss used as packing material in the mail from Japan. Living specimens of the scale insect Diaspis radicicola Ferris were taken at El Paso, Tex., on November 23, 1938, on cacti in baggage from Mexico. A living larva of the danaid Danaus menippe (Hbn.) was collected on February 10 on milkweed (Asclepias curassavica) in the field at Corozal, P. R. A living specimen of the lygaeid Cryphula trimaculata (Dist.) was found at Nogales, Ariz., on February 25 on eggplant in cargo from Mexico. Five living pupae and one living adult of the West Indian sweetpotato weevil (Euscepes postfasciatus Fairm.) arrived at New Orleans on March 20 in sweetpotatoes in ship's stores from Trinidad. A living larva of the European corn borer (Pyrausta nubilalis Hbn.) was intercepted at New York on October 26, 1938, in an apple in baggage from Italy.

Pathological interceptions of interest.---Cercospora musae Zimm. was found on banana leaves used as packing in baggage from Trinidad on June 26. Colletotrichum crotalariae Petch was intercepted on pods of Crotalaria sp. on February 9 in baggage from St. Thomas, British West Indies. Coniothyrium fuckelii Sacc. was found on oranges from Italy on March 24. Elsinoe australis Bit. and Jenk. was found on April 26 on oranges from Brazil. Gloeosporium heliciis Oud. was intercepted on plants of Hedera helix in baggage from Portugal on June 12. Gloeosporium lebbek Syd. was found on pods of Albizzia lebbek on March 13, in baggage from Bahamas. Peronospora pisi (de B.) Syd. was found in peas from France on May 29. Phomopsis cocomes Petch was found on husks of coconuts from St. Lucia on February 17. Phyllosticta sp., unlike any species described on Codiaeum, was found on leaves of that host from Bermuda on February 17. Puccinia absinthii (Hedw. f.) DC was intercepted on June 7 on Artemisia longifolia plants in baggage from Bermuda. P. extensicola hieraciata (Schw.) Arth. was found on lettuce from Holland on June 19. Trematosphaeria cactorum Earle was found on Echinocactus mathssonii plants under special permit by mail from Mexico on May 31 at San Francisco. All of these interceptions except the last one were made at the port of New York.

DOMESTIC PLANT QUARANTINES

Grasshopper-bait shipments reach new record.--A new all-time peak has been reached this year in furnishing grasshopper bait to cooperating States, more than 236,000 tons having been made available. North Dakota has received the largest quantity, with Montana, Colorado, and Minnesota following in order.

Grasshopper control in Southern Great Plains.--The large-scale baiting operations which have been carried on this season for the long-winged migratory grasshopper in the Panhandles of Texas and Oklahoma and adjacent areas of Colorado, New Mexico, and Kansas have proved very effective. No extensive flights of these hoppers have been reported and it is believed that the serious-trouble stage has passed. The surveys showed where egg beds were located and enough bait has been spread to keep the population well below the danger point. A mortality rate of from 80 to 90 percent with one spreading was common. Baiting is continued in parts of the areas in July.

Grasshopper baiting in Northern Great Plains.--The lesser migratory hopper of the Northern Great Plains matured rapidly following rains the first half of June and by the 20th of the month work was under way, supplemented with Federal crews in Montana, North Dakota, South Dakota, Nebraska, and Wyoming. Prolonged rains, however, hampered the baiting operations. By the close of the month local dispersal flights were occurring in the direction of prevailing winds with heavy crop losses in localized areas, and 2,700 Federal workers and 1,300 Federal spreader units, in addition to thousands locally owned, were intensively working to save the crops. Most of the mixing stations in the area were operating on a 24-hour day. By the early part of July Federal crews and farmer spreader units, formerly assigned to baiting on idle and abandoned lands, were concentrated on immediate crop protection, as the hopper population on the unused lands was dwindling. Operations are continuing at full speed, with plenty of bait and generally good support from farmers. Notwithstanding flights and severe crop damages in limited areas, enormous acreages of crops are being protected.

Mormon cricket activities at height.--The drying of range plants in the early part of June caused Mormon crickets to invade cultivated lands en masse and control measures throughout the 9 States where operations are carried on were rapidly increased, reaching the peak of activities about the middle of the month. With the increased use of power dusters, making possible the dusting of large areas early in the season, effective control has been accomplished throughout the region as a whole. Excellent kills have been reported by supervisors of the various areas and crop losses were held to a minimum. Good cooperation has been received from farmers, the Forest Service, the Indian Service, and the C. C. C. Farmers and ranchers have expressed themselves as well satisfied with the results. By the close of June the cricket bands were greatly reduced and control work has, accordingly, been more difficult with the advance of the season. Canals and streams have dried up, precluding the use of oil-on-water as a barrier. Many miles of metal barrier are in use successfully holding marching crickets, and over 1,800 pit-traps have caught and destroyed countless thousands of crickets. The area dusted to the close of June totaled nearly 230,000 acres.

Mormon cricket infestations.--Throughout most of the infested States, Mormon crickets reached the adult stage earlier than in 1938 and oviposition, first reported on May 29, in Washington County, Idaho, was generally from 2 to 3 weeks earlier than last year. Early instar nymphs were still found in the higher altitudes by the latter part of June, however, necessitating continued control operations in July. A larger number of crickets than had been anticipated existed this year in several States, particularly in Nevada and in several counties in Oregon, Montana, Wyoming, and Utah. Nevada crews were hard pressed to prevent crop damage. Crop losses were for the most part held to isolated ranches. Damage to range plants was quite heavy in June in Nevada, Idaho, Oregon, and Montana. Certain range plants in the Whitman National Forest in Oregon were "stripped of all foliage and eaten to the ground." In many other areas of the infested States, however, crickets have not given the trouble anticipated.

Areas treated for white-fringed beetle.--Control activities in June were intensified in an earnest effort to destroy every white-fringed beetle possible at this period of emergence. All railroad rights-of-way in the infested areas were sprayed with herbicide at least once, some several times, killing the weeds in which beetles were likely to congregate. The work was accomplished with specially devised sprayers of as much as 8,000-gallon capacity and others of 600-gallon capacity mounted on trucks. Railroad companies assisted in the work. In the New Orleans area 770 miles of railroad trackage constituting all lines serving that city had been sprayed to the close of June. At Florala and Lockhart, Ala., the operators working in double shifts to take advantage of the fair weather put out as many as 21 loads a day. It was found possible to load a 400-gallon sprayer and have it ready to go in 4 minutes. At Mobile, Ala., repeated spraying was effective in keeping down the heavy growth of weeds on the area treated, with particularly encouraging results on areas that had been sprayed last year. The first application required 750 gallons to the acre; the second, 550 gallons; and the third, 300 to 400 gallons. Dusting operations have been carried on in infested areas that were not sprayed, including the environs of 61 New Orleans nurseries and other localities where beetles were found in 1938. At Florala, Ala., 15 small dusters were supplied to farmers for treating their crops. In small isolated infestations fumigation, together with spraying and placing of dust barriers, is going forward in an effort toward eradication. The effectiveness of these suppressive measures is indicated by the fact that up to the first of July not a single adult beetle has been found at Mobile, Ala., Baton Rouge or Lake Arthur, La., or at 3 isolated points in Mississippi where infestations existed last year.

Inspection for white-fringed beetle.--Federal and State inspectors for the 4 infested States carried on inspection for the white-fringed beetle in June. A survey for larvae in the Florala, Ala., area showed an average of 14 larvae per square yard on 98 properties. In 3 known infested counties in the Monroeville, Ala., area, new infestations totaling 1,284 acres have been found this season.

White-fringed beetle quarantine restrictions modified.--Circular B. E. P. Q. 485 was revised, effective July 7, to extend the period of exemption from certification to February 1, 1940, of several restricted commodities when shipped from designated parts of the regulated areas in the four quarantined States.

Sweetpotato-weevil control activities.--Inspections for the sweetpotato weevil in the past year, in Alabama, Georgia, Mississippi, and Texas, jointly with inspectors of these States, brought to light 891 properties infested with the weevil. In the previous year 2,558 properties in these States had been found infested. Activities in June, this year, included the inspection of 341 properties, with 30 found infested, and the reinspection of over 1,000 properties in the quarantined areas. In addition, the Mississippi State inspectors are making a survey inspection of areas in 9 counties of that State. Eradication measures were carried on in localities of the 4 States, as well as regulatory work involving the removal of some illegal plantings.

Peach disease work.--Nearly 9,000 properties in 20 States have been inspected thus far this season for the phony peach and peach mosaic diseases. In June 98 Federal and 67 State and county inspectors worked on the project. Relief crews, totaling 967 men, removed diseased, abandoned, and infected peach trees.

Peach mosaic control.--Inspections in June for the peach mosaic disease were confined to orchards in seven known infected States. Decidedly fewer mosaic trees were found on the second inspections in California and Colorado than on second inspections of these areas in 1938. All diseased trees were removed from Mesa County, Colo., the heaviest infected area in that State, by June 30. This is the first time that a 100-percent removal has been accomplished in that area by this date. In Wilbarger County, Tex., the mosaic disease reappeared this year, the first since 1937. In Salt Lake County, Utah, where the disease existed in 1938, no mosaic was found this year.

Over 600 nurseries are phony-free.--Phony peach inspections in June were concentrated on peach nursery environs in 13 States. All phony trees found within the environs of nurseries were removed prior to June 30, making all inspected nurseries eligible for certification under requirements of the standardized State quarantines. The numbers of such nurseries, by States, are as follows:

Alabama	19	Mississippi	24
Arkansas	53	Missouri	6
Georgia	64	North Carolina ..	13
Indiana	1	South Carolina ..	8
Kentucky	3	Tennessee	199
Louisiana	10	Texas	204

Inspection work is still in progress in Illinois.

Citrus canker eradication.--The W. P. A. force working on the removal of abandoned and escaped citrus trees was increased to 201 in June. Working in the Houston, Tex., area, they destroyed 290,000 such trees. Five inspectors made inspections in June for citrus canker in Chambers, Harris, and Montgomery Counties, Tex., covering over 400 properties. No canker was found. Although most of the trees inspected are escaped Citrus trifoliata, several plantings of old abandoned trees have been located along the Houston ship channel and on large ranches in Harris County.

Farm produce inspected in transit.--Farm produce consigned from areas infested with the Japanese beetle and from those infested with the white-fringed beetle is receiving special attention at transit inspection points to determine whether such products have been certified at origin. Railway cars after being unloaded are inspected for the possible presence of either of these beetles. One live Japanese beetle was found at Cincinnati in a car of beans consigned from a point in Maryland. Arrangements have been effected in Chicago for the inspection of boats carrying any restricted products from the white-fringed beetle area. Shipments from the Japanese beetle area are also examined to see whether they are so covered as to prevent beetles from entering containers when passing through the infested area.

Violations intercepted.--Transit inspectors intercepted 295 apparent violations of Federal quarantines in June, and 6 were reported by California State inspectors. Boston inspectors reported several violations in the shipping of uncertified cut flowers to isolated points in the Japanese beetle area.

Sweetpotato-plant shipments.--A large volume of sweetpotato plants, certified under sweetpotato weevil quarantines, has been observed by the Atlanta transit inspector, who states that 130 million such plants have been shipped from Georgia this season, according to records.

CONTROL INVESTIGATIONS

Nicotine-atomizing apparatus for greenhouse fumigations.--Further tests by H. H. Richardson and J. W. Bulger, of the Beltsville, Md., laboratory, on the nicotine-atomizing apparatus for greenhouse fumigations have corroborated the results of last year. A maximum nicotine concentration of about 40 percent of the original dosage (1/16 oz. 40% nicotine per 1,000 cu. ft.) was obtained at 5 to 10 minutes from the start, but concentrations fell away rapidly so that little nicotine remained after the first hour. In an effort to increase efficiency various changes were tried to no avail.

INSECTICIDE INVESTIGATIONS

Particle size affects toxicity of sodium arsenite to Mormon cricket.--The question of the effect of particle size on the toxicity of sodium arsenite to the Mormon cricket (Anabrus simplex Hald.) has been investigated by O. A. Nelson of this Division, in cooperation with the Division of Domestic Plant Quarantines, the Division of Cereal and Forage Insect Investigations, and the Department of Entomology of the Montana Experiment Station. The experimental work was carried out in Montana. Commercial sodium arsenite was fractionated according to particle size, and test samples were made with several fillers. Tests on Mormon crickets have shown that finely subdivided sodium arsenite is much more toxic than is the coarser product. The effect of the different diluents is not as pronounced as that of the particle size of the poison, but the results indicate that where the diluent is exceedingly fine it forms a protective coating around the particle of the poison and retards its action. When finely divided sodium arsenite was mixed with a coarser diluent more rapid kills were obtained. A crude grade of sodium arsenite when finely ground was found to be equally as toxic as the purified white sodium arsenite. White arsenic (As_2O_3) showed little or no toxicity toward the Mormon cricket, regardless of fineness. Mr. Nelson has recently returned from Montana, where toxicological tests were carried out in cooperation with J. H. Pepper and Mr. Hastings of the Department of Entomology, Montana State College.

BEE CULTURE

Winter pollen reserves needed for spring brood rearing.--The value of winter pollen reserves has been further brought out by J. D. Hitchcock, of the Intermountain States Bee Culture laboratory, in a study on the pollen consumption of honeybees during winter. The following is taken from a summarized report of this work: "Pollen consumption occurred throughout the winter period in colonies with both abundant and negligible pollen reserves, but was considerably greater in the former and increased in March and April, whereas the colonies with negligible reserves showed a decrease in pollen consumption in these months. This reflected the greater brood-rearing activity of the colonies with abundant pollen reserves. In the process of reliquefying granulated honey, bees reduced its pollen count from 7,000 to 600 grains per cubic centimeter, but were unable to feed their brood adequately in the absence of stored pollen. Consumption of honey late in winter and early in spring was much greater in the colonies with pollen reserves, but wax secretion was similar in all. Pollen consumption did not appear to be influenced by parasitic infection with Nosema and Malpighamoeba, both parasites showing a marked increase early in spring." The reduction in the pollen content of the reliquefied honey is highly interesting because it bears out observations mentioned in the last number of the News Letter (v. 6, No. 7, pp. 35-36) on the rapidity with which pollen grains are removed from honey in the honey sacs of worker bees.

Optimum temperature for survival of bees in cages found to be 93.9°F.--A. W. Woodrow, of the Intermountain States Bee Culture laboratory, has been studying factors that influence the survival of bees in cages in order to develop standardized survival methods for adult bees. Some of his results from recent work on the effect of temperature are given in the following summarized report: "A series of experiments to study the effect of temperatures on caged bees, begun January 24, was completed May 10. Bees fed only water lived 3 days at 99.6°F., but at temperatures of 81.7° to 93.9° they lived from 4.1 to 5.1 days. Bees fed only 50-percent sucrose sirup lived 2.2 days at 99.6°, but at temperatures of 81.7° to 93.9° they lived from 38.4 to 67 days. When fed both 50-percent sucrose sirup and water they lived from 12.2 to 33.6 days at 99.6°. In general, they lived longer on 50-percent sucrose sirup and water at 93.9° than at lower or higher temperatures, indicating that this is about the most suitable temperature investigated. These tests were conducted with relative humidities ranging from 20.2 to 24.7 percent, which have previously been found to be nearly optimum for studies of caged bees."

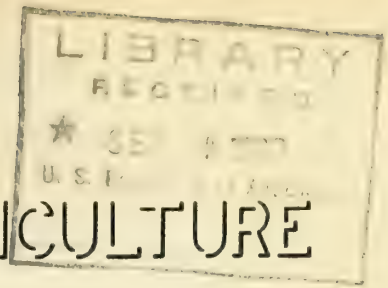
IDENTIFICATION AND CLASSIFICATION OF INSECTS

Mouth parts of the chigoe.--A study of the chigoe (Tunga penetrans (L.)), the aggravating flea pest of tropical countries, has revealed some rather interesting modifications of the mouth parts, as observed by H. E. Ewing and Irving Fox. Both the maxilla and the labial palpus are very much reduced, the former being withdrawn entirely into the head and the latter being apparently modified into a piercing structure having no setae and exhibiting indistinct segmentation. The labrum and the mandible are long and conspicuous and extend well beyond the trochanters of the first leg.

Distribution of recently described pentatomid.--Early in May, C. F. Hartung, of the Forest Service, submitted for determination a number of specimens of a pentatomid found hibernating in a house on St. George's Island, Md. These were identified by H. G. Barber as Edessa florida Barber, described in 1935 from specimens collected by H. S. Barber at Royal Palm Park, Fla. On May 21 many specimens were observed on the island feeding on the stems of the widely distributed plant Convolvulus sepium L. The species was previously known only from Florida.

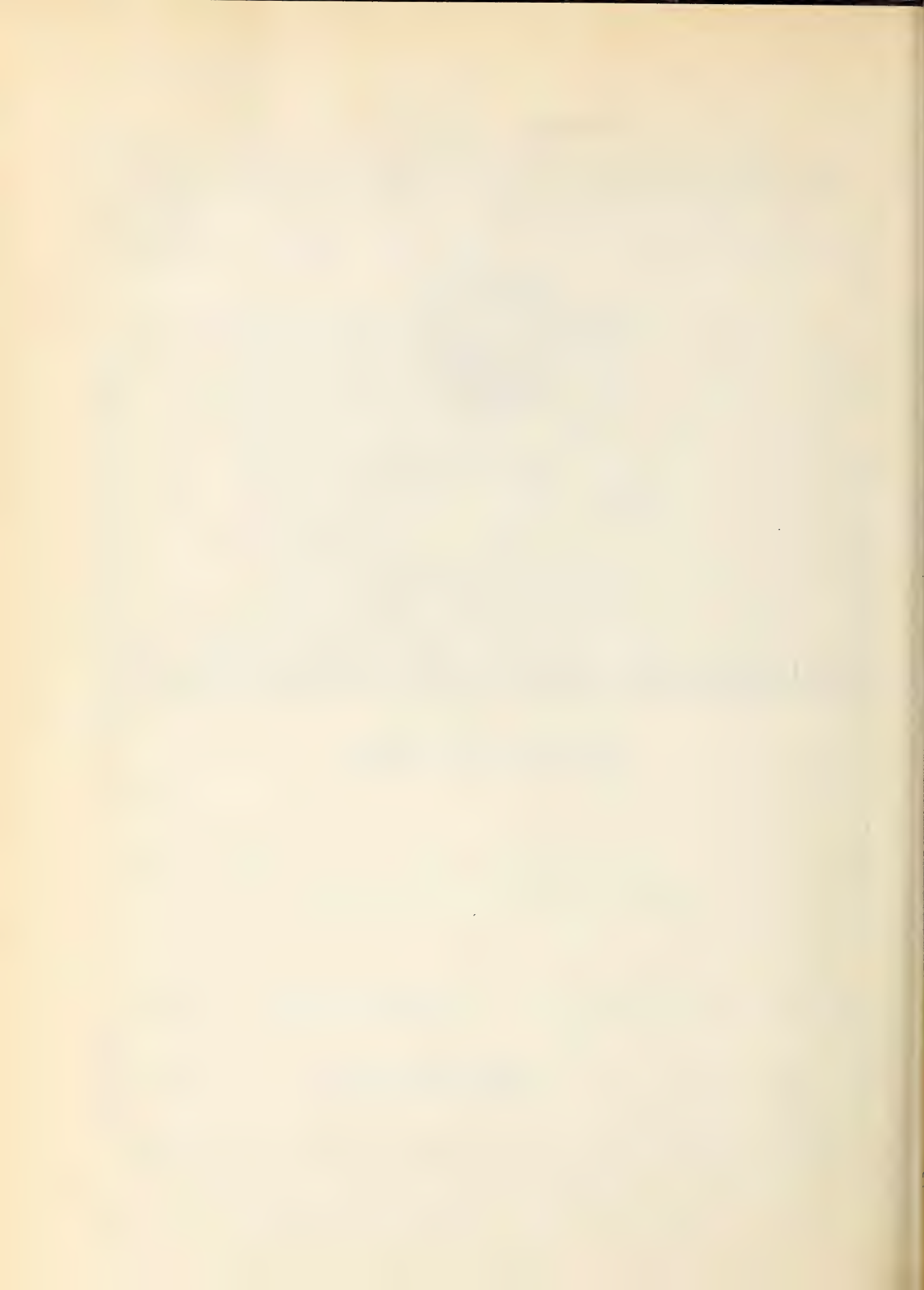
Early records of lily-bulb thrips in United States.--The lily-bulb thrips (Liothrips vaneeckei Priesner) was described in 1920 by Priesner from a series of specimens collected June 28 and July 12, 1915, on Lilium pardalinum Kellogg in Holland. This species of thrips was found in the Pacific Northwest in 1930 and 1931 and notes on its distribution and habits were made by R. Schopp and C. F. Doucette, of this Bureau, who published their observations in 1932 (Jour. Econ. Ent. 25: 1016-1019). Mr. Schopp continued the study of L. vaneeckei and a paper by him giving the complete biology of this species appeared in 1936 (Jour. Econ. Ent. 29: 1099-1103). Apparently the earliest available record of L. vaneeckei in the United States pertains to an interception by the Division of Foreign Plant Quarantines on August 18, 1924. That the species was here several years earlier is verified by a series of specimens from three different localities found among some miscellaneous undetermined material that was recently identified by Floyd Andre and incorporated in the National Collection of thrips. The first series of slides was collected at Lawrence, Kans., in 1919 by S. J. Hunter from lily bulbs; the second at Martinsville, Ind., November 21, 1919, by F. N. Wallace on lily bulbs coming from Philadelphia, Pa.; and the third at New York, September 16, 1920, by A. J. Bruman on lily bulbs from France.

UNITED STATES
DEPARTMENT OF AGRICULTURE



BUREAU OF
ENTOMOLOGY AND PLANT QUARANTINE
NEWS LETTER

VOLUME VI



UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

NEWS LETTER

FOR JULY 1939

Vol. VI, No. 9

(Not for publication)

September 1, 1939

ADMINISTRATION

Adam Böving

Adam Böving, senior entomologist of the Division of Insect Identification and outstanding authority on coleopterous larvae, retired on July 31, 1939. Mr. Böving entered Government Service in 1913 as a specialist in coleopterous larvae in the Division of Forest Insects under A. D. Hopkins, after a distinguished career as a coleopterist in Denmark. Upon the formation of the Taxonomic Unit of the Bureau of Entomology (later reorganized as the Division of Insect Identification), Mr. Böving was transferred to that section, and there he remained in charge of the taxonomic work on coleopterous larvae until his retirement. He is the author or coauthor of 39 important papers on entomological subjects, 34 of which have been published during his connection with the Bureau. Most outstanding and best known of these is "A Synopsis of the Principal Larval Forms of the Order Coleoptera" (1931), written in collaboration with F. C. Craighead, in charge of the Division of Forest Insect Investigations. This work shows the larval relationships among the families of the order, gives keys to the families and many of the subfamilies, and is copious with original drawings made by the authors. It has been generally acclaimed by entomologists here and abroad as the most important single contribution in recent years to the taxonomy of Coleoptera. Mr. Böving's unusually broad training in Denmark, his interest in all branches of entomology, his unfailing courtesy, and his cordial cooperation with other entomologists have contributed to make him one of the most useful and best liked employees in the Bureau. Although retired, he will continue his scientific research, his immediate objective being a study of the larvae of the genus Phyllophaga.

FRUIT INSECT INVESTIGATIONS

Use of salt solution in bait-trap collections.--Dwight F. Barnes, of the Fresno, Calif., laboratory, reports that, because of its preservative action, common salt is useful in making bait-trap collections. The fermented malt-sirup solution is poured from the traps through a strainer, the insects strained out being put into pint jars nearly filled with water. The material usually is looked over the next day. In hot weather the insects in the water ferment, soften, and give off disagreeable odors,

adding to the difficulty of making determinations. Enough salt to make a saturated solution, added to the water in the jars as they are being filled preparatory to being taken to the field, reduces the trouble. The concentrated solution also aids by floating the insects when the contents of the jars is poured into enamel pans for examination.

Seasonal development of Catalina cherry moth correlated with that of its host.--S. M. Dohanian, in charge of the Eugene, Oreg., laboratory, has reported interesting observations on the seasonal development of the Catalina cherry moth (Melissopus latiferreanus Wals.). This insect is an important pest of filbert in the Northwest and also infests native hazelnut, oak acorns and galls, and other hosts. The wild hazelnut develops more rapidly during the summer than does the cultivated filbert and its nuts mature several weeks sooner. The emergence of moths from the material from infested hazelnuts reached its maximum 3 to 5 weeks ahead of that for moths emerging from infested filberts. On the latter host the emergence continued over a protracted period of time. The data relating to oak are not sufficiently complete to justify conclusions.

Addition of sugars to lead arsenate for codling moth control.--E. H. Siegler, in charge of the fruit-insect work at Beltsville, Md., has just submitted a note dealing with the addition of sugars on the effectiveness of lead arsenate in codling moth control. This work has been carried on in the laboratory by the use of the apple-plug method. The following table illustrates some of the preliminary results obtained.

Spray material: and dosage	Pounds-gallons:	Plugs	
		Total Number	Wormy Percent
Check-----	---	214	98.6
Lead arsenate--	4-100	419	27.2
Lead arsenate--	4-100)		
Brown sugar----	16-100)	420	11.0
Lead arsenate--	4-100)		
Sucrose-----	16-100)	424	9.7

Other experiments have indicated that the addition of summer-oil emulsion at a strength of approximately 1 percent does not interfere with the influence of sugar on the effectiveness of lead arsenate. The experiments have also indicated that brown sugar is not toxic to the codling moth and that summer oil alone has comparatively little effectiveness when used in accordance with the technique followed at the Beltsville laboratory.

MEXICAN FRUITFLY CONTROL

Record July catch of fruitflies.--Although considerably less than half as many flies were trapped in the lower Rio Grande Valley in July as were taken in June, the month's catch was the highest on record for that period. These flies are the remnants of the high fly population present in the spring. Trap recoveries throughout the latter half of July, however, indicated that the population was rapidly decreasing and

it is expected that flies will be exceedingly scarce during the latter part of the summer and early part of the fall. The new citrus crop is reported as being normal as regards maturity at this season of the year, with an estimated production approximating last season's 47,500 equivalent carloads.

CEREAL AND FORAGE INSECT INVESTIGATIONS

European corn borer parasites in Lake States at close of 1938.--W. G. Bradley, Toledo, Ohio, reports as follows on surveys conducted in October 1938 to determine the status of exotic and native parasites of the corn borer in selected districts in the Lake States infested area: "In these surveys 192 sample collections, comprising 13,541 larvae, were taken. This material, held in cold storage during the winter and reared in March and April, produced 3 species of exotic parasites. One of these, an ectophagous chalcid, Eulophus viridulus Thoms., appeared in 1938 on a maintenance basis for the first time. A total of 19 borers killed by this parasite were taken in 12 samples in the vicinity of the release point at Jerusalem Township, Lucas County, Ohio, the maximum distance from the release center at which the parasites were recovered being approximately 5 miles. No release had been made at this point since 1932. One colony was taken in close proximity to the release point in Erie Township, Monroe County, Mich., where releases of 20,081 adults were made in 1932. A colony was recovered in Danbury Township, Ottawa County, Ohio, at a point 8 miles from the nearest release center, 4 miles of this distance being across the water of Sandusky Bay. The most abundant parasite recovered was the tachinid Lydella stabulans var. grisescens R. D. This species showed a general increase in numbers over 1937 at all points examined in both years. In Perkins Township, Erie Co., Ohio, the parasitization within $1\frac{1}{2}$ miles of the release center increased from 8.4 percent in 1937 to 38.1 percent in 1938, or an increase of about 350 percent. The parasitization of borers in several samples was over 50 percent. At a point in Jerusalem Township, Lucas County, surveyed by using the same type of polar coordinate as in previous years, an increase in parasitization was noted in all rings of the design as shown in the following table.

Distance from center	Parasitization in	
	1937	1938
<u>1/</u>	<u>Percent</u>	<u>Percent</u>
First ring -----	23.1	24.6
First and second-----	19.3	23.5
First to third, incl-----	17.1	20.9
First to fourth, incl----	12.2	15.1
First to fifth, incl-----	9.6	13.0

1/ Center circle is 1 mile in diameter; the inner three rings are each 1 mile wide; the outer two rings are each 2 miles wide.

The parasitization at this point in Jerusalem Township, within $3\frac{1}{2}$ miles of the release point, has increased annually as follows:

Year	:	Parasitization
	:	Percent
1932-----	:	0.2
1933-----	:	2.8
1934-----	:	6.3
1935-----	:	7.6
1936-----	:	10.0
1937-----	:	17.1
1938-----	:	20.9

The progressive increase in parasitization, together with the fact that the greatest increase occurred in the second and third rings indicated that L. grisescens had not reached equilibrium with its host, even within the $3\frac{1}{2}$ -mile radius of the release point. Some of the samples showed parasitization of over 80 percent, principally by Lydella. Collections made to determine the distribution of L. grisescens in the vicinity of marshland along the bays and inlets of Lake Erie and the Detroit River showed the tachinid to be present in varying densities from the Huron River east of Sandusky, Ohio, to the outskirts of Detroit, Mich., a distance of over 130 miles. Within this strip are several release points and the survey showed fairly uniform decrease in density of the parasite as the distance from the release points increased, indicating that dispersion was still taking place. The braconid Chelonus annulipes Wesm. was recovered in Adams Township, Lucas County, as a result of the releases made at this point in 1938. Three native parasites, viz., Zenillia caesar Ald., Panzeria penitalis Coq., and Labrorychus prismaticus Nort. were recovered in small numbers in the fall collection."

Effect of chloropicrin on germination of wheat.---J. C. Frankenfeld, Manhattan, Kans., reports that in tests conducted to evaluate the effect of various controllable factors affecting the germination of wheat when treated with chloropicrin, it was found that the percentage of germination after treatment with a given dosage, decreased as (1) the percentage of seed moisture increased; (2) the period of exposure increased; and (3) the temperature increased. Wheat containing from 10- to 12-percent moisture was practically uninjured with a dosage of 6 pounds of chloropicrin per 1,000 bushels when exposed to the fumigant for a period of 12 hours at a temperature of 95° F. With smaller dosages, the period of exposure can be extended proportionately. Wheat having a moisture content of from 14 to 16 percent, suffered considerable damage after an exposure of 6 hours. With dosages of from 1 to 3 pounds of chloropicrin per 1,000 bushels of wheat, practically no injury resulted to wheat containing from 10 to 12 percent moisture, even when the period of exposure was extended to 72 hours and the temperature raised to 120°. In wheat having from 14 to 16 percent moisture, and given the same treatment, the percentage of germination was greatly reduced after a 6-hour exposure. At a temperature of 50° wheats having moisture contents varying within the extreme limits previously mentioned, can be treated with safety at dosages of 1 to 6 pounds, for periods of exposure not exceeding 12 hours.

Flour-mill fumigation with mixture of methyl bromide and hydrocyanic acid.--R. T. Cotton and Geo. B. Wagner, Manhattan, Kans., report that a test was recently made to determine whether or not a 1-to-8 mixture of hydrocyanic acid and methyl bromide would be more efficient as a mill fumigant than either gas used alone. A 90-pound dosage of the mixture introduced into the milling machinery failed to give a complete kill, although conditions for the test were as nearly perfect as could be obtained. The kill of flour beetles obtained was somewhat better than that obtained with a dosage of 80 pounds of methyl bromide alone, but not so good as that obtained with a dosage of 50 pounds of liquid HCN used alone. No synergistic effect was noticeable as a result of combining the two fumigants.

The returned-bag menace.--Mr. Cotton also reports that the custom of using flour bags over and over again is one of the serious sources of insect infestation in flour mills. A recent survey of 102 mills that shipped about two-thirds of all baking flour used in the United States, has shown that 1 bag out of every 16 furnished by bakers to the flour mills for refilling with flour is entirely unfit for use, being either too weak or torn for repair, or too dirty for effective cleaning. An additional 1 out of 5 is not suitable as received but must be reconditioned by repairing or laundering, or both. Forty-four percent of all bakery-flour shipments went out last year in used bags. These empty used bags are stored in piles by the bakers until enough have accumulated to return for refilling. They contain enough flour to support the heavy infestations of insects present in them. These infested bags are usually stored without treatment on a floor of the mill or warehouse to which they have been returned, and where they serve as a potential source of infestation for the entire mill. Prior to refilling they are cleaned by some type of air suction; yet it is well known that such cleaning does not remove all stages of flour-infesting insects. The Oklahoma State Board of Health, recognizing the undesirability of using flour bags more than once, has recently issued an order prohibiting the sale of flour in used containers in Oklahoma and also prohibiting the use of flour, packed in such containers, in bakeries located in that State..

Weevil infestation in flour.--Mr. Cotton and T. F. Winburn state that, according to the Millers' National Federation, a number of flour jobbers in the South are urging millers to furnish guarantees that their flour is free of weevil infestation. Some dealers are asking for a warranty as to its condition at time of shipment and others are specifying that such guarantees should be good for 30 days or more after shipment. Even though flour were entirely insect free at the time of shipment, such a guarantee would be hazardous, owing to the possibility of the flour becoming infested while in transit. Many cars used for the shipment of flour have previously carried grain, and examination of such cars revealed the presence of many species of insects breeding in the accumulations of grain and grain dust in them. This was particularly true immediately after the heavy movement of grain at harvest time. Examinations made in July of a number of cars taken at random showed more than 90 percent to contain insects in accumulations of grain. Blowing with air, spraying with contact sprays, and fumigating with various gases are methods of attempted control employed by different railroads, but investigation of these practices indicated that, because of the construction of many of the cars, none of these methods gave perfect results at all times.

Lime, sand, and other dusts ineffective in control of insects in stored grain.--According to Messrs. Wagner and Winburn, Manhattan, recent tests with a number of dusts such as finely ground sand, wood ashes, lime, sulphur, soybean flour, and borax, indicate that, with the exception of the last-mentioned dust, these substances, when mixed with stored grain at the rate of 1 or 2 percent by weight, have no appreciable effect in preventing insect development unless the moisture content of the wheat is low. Borax has a decided protective action, but cannot be recommended, owing to the fact that it is absorbed by the grain.

Methyl bromide successful as fumigant for rice.--A. I. Balzer, Beaumont, Tex., reports that in the recent fumigation of a 365,500 cubic-foot warehouse containing $3\frac{1}{2}$ million pounds of rice, a dosage of $\frac{1}{2}$ pound of methyl bromide per 1,000 cubic feet, or 0.85 ounce per 1,000 pounds of rice, gave a complete kill of insects with an exposure of 42 hours. The temperature was 87°F.

Hessian fly resistance of Dawson wheat bred through five backcrosses to susceptible varieties Poso and Big Club.--W. B. Noble, Sacramento, Calif., reports that in the program of breeding wheats resistant to the hessian fly in California, the hybrids Dawson (resistant) X Poso (susceptible) and Dawson (resistant) X Big Club (susceptible) were carried through five backcrosses to the susceptible parents, in order to eliminate certain agronomic characters of Dawson that were not wanted in the finished hybrid. Tests completed in 1939 on 313 BC^5F_2 families indicate that the fly resistance of Dawson was successfully transmitted through the five backcrosses.

BC^3 Dawson X Big Club shows promise in field trial.--Mr. Noble says that in 1937 selections were made from BC^3 Dawson X Big Club, and seed increased in 1938. In 1939 a composite of these selections was grown for field trial at Bird's Landing, Calif. This hybrid showed no fly infestation and noticeably outyielded nearby regular Big Club, which bore a plant infestation of 70 percent.

European corn borer in early market sweet corn.--A. M. Vance, Toledo, Ohio, submits the following tabulation showing the intensity of corn borer populations in early sweet corn grown for market in certain counties of Connecticut, New York, New Jersey, and Ohio. The survey in New Jersey was conducted by C.A. Clark, Moorestown, and data in New York were taken in cooperation with L. A. Carruth, of the Agricultural Experiment Station at Geneva, N. Y.

Infestation in 1939 was most severe in New Haven County, Conn., where half of the fields surveyed averaged 20 or more borers per plant and in Ulster County, N. Y., where the same proportion of the fields averaged 10 or more borers per plant. The most pronounced increase of the pest in sweet corn occurred in Burlington County, N. J., where the average number of borers in 1939 was 8 times that in 1938. Less than half as many borers infested the crop in Lucas County, Ohio, in 1939 as in 1938.

State and county	1939			Average	
	Fields :	Dates of :	Average borers:	borers per	
	surveyed:	survey :	per plant	plant in 1938	
	Number :		Number	Number	
Connecticut:	:	:	:	:	:
New Haven-----:	25	July 15-19	19.8	8.8	
New York:	:	:	:	:	:
Ulster-----:	14	24-26	12.6	--	
Albany-----:	17	24-29	7.5	6.2	
Columbia-----:	17	20-27	5.4	4.0	
New Jersey:	:	:	:	:	:
Burlington-----:	29	5-11	4.2	.5	
Ohio:	:	:	:	:	:
Lucas-----:	25	Aug. 1-5	8.2	17.5	

JAPANESE BEETLE CONTROL

Airport-inspection service.--Two inspectors were stationed at the Newark, N. J., municipal airport the middle of July. One worked from 9 a.m. to 6 p.m., the other from 11:30 a.m. to 7:30 p.m. The inspectors worked with the employees of the various transport lines in ridding both passengers and planes of Japanese beetles before the ships embark. The first plane infestation was found on July 12 when 1 beetle was taken from the baggage compartment of a plane bound for Chicago. It was almost a daily occurrence during the remainder of the month for from 1 to several beetles to be removed from the baggage compartments, cabins, or the passengers themselves. Over 30 active beetles were prevented from obtaining free air transport to such points as Los Angeles, Calif., Miami, Fla., Chicago, Ill., Kansas City, Mo., and Fort Worth, Tex. In some controlled tests, live beetles were placed in cages, some with foliage and others without, and carried in airplanes on regular passenger routes between Newark and Pittsburgh, both points within the infested zone. Altitudes during the flights ranged from 2,000 to 8,000 feet, and the speed of the planes from 165 to 180 miles per hour. The cages contained from 66 to 95 beetles each. In only 3 of the 6 flights involved were any beetles found dead upon arrival at Pittsburgh, and in no instance did more than 4 beetles succumb. Presence or absence of food on these short flights was found to have no appreciable effect on beetle survival.

Activities on the Eastern Shore.--Activities in connection with the summer quarantine on fruits and vegetables were quite heavy on the Eastern Shore of Maryland and Virginia and in Delaware during the month, although the work was considerably under the same period of last year. This was due to a decrease in the methyl bromide fumigation of loaded refrigerator cars caused by a reduction in the potato crop as a result of dry weather. Packers and shippers cooperated in keeping their packing sheds beetle-proof. Daily checks were made to see that screens were in place and the houses free from beetles. An inspector checking trucks crossing the Cape Charles-Norfolk ferry reported an increase in southbound

truck traffic late in the month. All drivers with uncertified material intended for movement outside the regulated area were informed of the inspection regulations. Inspectors of farm products, when not busy with actual inspection work, scouted around the loading points and located many new infestations. Presence of adult beetles at these points was attributed to the cleaning of trucks returned from the heavily infested area. As many as 25 live beetles were picked from the screens of trucks arriving from sections where beetles were swarming.

Beetle conditions in Philadelphia.--Small numbers of flying beetles were seen along the Philadelphia water front from July 15 to 20. Although the infestation was comparatively light, beetles were found in all parks and market places in the city. The largest infestations in the central portion of the city were located at the Port Richmond freight yard and Christ Church cemetery. Beetles were also present in the produce terminal yards in South Philadelphia, and numbers were found feeding on flowers in West Philadelphia. In suburban Philadelphia the beetles are about as numerous as last year. With the exception of several establishments in the southern portion of Chester County, Pa., which reported heavy infestations, the classified establishments in that section report the infestation to be about average or lighter than last season. Orchardists in the Philadelphia area who followed recommended spray schedules reported a minimum of injury to their fruit by the beetle. Severe damage to corn in the region east of Lancaster County was reported. The leaves, as well as the silk and tassels, were attacked and the unusual amount of leaf feeding caused the leaves to curl and dry.

Farm products inspection in New England.--At Portland, Maine, four Japanese beetles were removed from beans inspected and certified for shipment via truck to nonregulated points in Maine. During inspections at the Boston market, nine beetles were removed from beans from New Jersey, Maryland, and Connecticut and from blueberries and raspberries from New Jersey. While inspecting farm products for Japanese beetle infestation at a chain store warehouse at Somerville, Mass., inspectors found two gypsy moth larvae and one gypsy moth pupa in a shipment of two boxes of locally grown beans consigned to Caribou, Maine, a point outside the gypsy moth infested area. At the wholesale produce market in Portland, Maine, an inspector removed one gypsy moth larva from a box of beans destined to Camden, Maine. At the Quincy Market in Boston truckloads of potatoes and cucumbers from Delaware and Maryland were found to be bringing numerous Japanese beetles from these areas. The first shipment of Maine sweet corn at the Portland market was noted on July 31. This came from Gorham, Maine, and was found to be quite heavily infested with the European corn borer.

Japanese beetle control activities in New York City.--While there was an indication of increased infestation in the New York City area there was a decided decrease in the active flight, as compared to last season. After the finding of an infestation on a previously uninfested nursery establishment in Suffolk County, Long Island, the owner constructed a methyl bromide fumigation chamber for the fumigation of potted strawberry plants. Another important item in the certification of nursery stock on Long Island was the initial application during July of lead arsenate to 30,351 square feet of nursery area. A survey was started in July to determine general conditions of infestation in the New York City area.

Drought affected New Jersey quarantine activities.--Inspections during the month of July in New Jersey proved to be the lowest for several years. A 50-percent reduction in crop yields was reflected in the certification of approximately 23,000 units of farm products, as compared with nearly 76,000 units in July 1938. Potatoes were slow in moving because they were either too green to dig or the growers were holding them for better prices. Blueberry growers reported from one-third to one-half of a crop. The tendency of southern truckers to pick up pay loads of New Jersey potatoes on their return trips also required additional work in contacting some 300 growers whose crops have previously moved by rail. With quarantine activities in the State reduced, State-paid inspectors cooperated with the nematode laboratory in making contacts and arranging for the future general distribution of nematodes on a large scale for control of Japanese beetle larvae in the soil.

Inspections in Virginia.--It was necessary to employ an additional farm-products inspector at the Fredericksburg, Va., platform in order to handle the numerous truckloads of produce that reported at that station before proceeding to southern points. Quantities of Japanese beetles were removed from empty refrigerator cars upon their arrival by ferry at Little Creek, Va., from Cape Charles. The latter part of the month quite a few truck drivers who had been warned at Cape Charles against transporting uncertified produce to nonregulated area applied for inspection at the inspection platform in Norfolk. Also during the month nine truckloads of produce that had been intercepted at the road stations or by mobile inspectors returned to Norfolk for inspection. Eight beetles were removed from string beans examined at Richmond during the month. Nursery and greenhouse scouting in the Richmond area was completed late in July.

Japanese beetle control by rose growers.--Approximately \$2,000 has been spent each year for the last several years by one of the large rose-growing firms at West Grove, Pa., in an effort to keep the Japanese beetles from damaging their rose plants. Some 2,200 pounds of lead arsenate was used by this establishment in spraying their roses this summer. This was effective in keeping their plants in good condition despite a dense beetle infestation in the neighborhood. Another large grower in the same area has re-treated 3,987 square feet of soil with lead arsenate and has newly treated an additional 10,000 square feet for use in plunging potted plants next spring. Heavy defoliation of shade trees and shrubs was observed in some sections of the West Grove area.

Japanese beetle survey in newly regulated area.--With the inclusion in the regulated area of the city of Rochester and the town of Brighton, Monroe County, N. Y., under a modification of the regulated area effective July 1, 1939, an inspector was stationed in Rochester to contact nursery and greenhouse establishments. The quarantine regulations were explained and certificates were issued as necessary. In this area 42 nurseries and greenhouses and 1 soil establishment were classified. Several of these are actually located outside the regulated area, but use Rochester as their shipping and receiving center. An additional 64 establishments contacted claimed to have no need for classification.

Heavy beetle flight in Baltimore.--Beetle flight in Baltimore this year was the heaviest yet experienced in that city. Swarms were present from July 1 until about the 20th, after which they rapidly diminished. A covered conveyor system for loading bananas from boats into refrigerator cars was placed in operation at the fruit piers, but the beetle flight was so heavy that many bunches were rejected because of beetles crawling down into the bunches. Inspectors collected thousands of beetles daily at the railroad cleaning yards and at fumigation points.

Heavy build-up in beetle population in southern New England regulated area.--Nursery and greenhouse scouting in the New England States, begun in Connecticut on July 10 and in the other States on July 17, indicates a heavy increase in beetle population, particularly in Connecticut, where by the end of the month 11 classified establishments and 19 potting-soil and manure sources had been found infested. In Massachusetts beetles were found on 4 classified premises. Two sources from which classified establishments obtain potting soil were found infested in Rhode Island. A heavy invasion of the beetle in Hartford, Conn., was reported on July 10.

Japanese beetle trapping.--During July trapping was discontinued in 4 cities in Georgia, 3 in Kentucky, 4 in North Carolina, 6 in Ohio, 1 in South Carolina, 22 in Virginia, and 5 in West Virginia. First-record infestations, mostly of a few beetles each, were recorded in 2 cities in Indiana, 1 in Michigan, 6 in Ohio, 2 in Pennsylvania, 3 in Virginia, and 9 in West Virginia.

Beetles invade boardwalk.--Vacationers at Ocean Grove, N. J., reported that on July 15 a heavy flight of the beetle occurred at that resort. On the following day a flotation of dead beetles annoyed bathers at Seaside Heights, farther south on the Jersey coast.

Municipal Japanese beetle trapping.--By the end of July approximately 200,000 Japanese beetles had been trapped in 1,600 traps set by the Park Department in the city of Springfield, Mass. A report from the Rhode Island authorities states that at the end of the month over 1,500,000 beetles had been trapped in Providence and adjoining sections.

Gypsy moth egg masses reappear in inspected material.--In the quantities of quarantined products inspected and certified during the month, various stages of gypsy moth infestation were found in 9 lots. The first newly laid egg masses to be removed from an inspected shipment were taken from 4 truckloads of lumber moving from New Salem, Mass., to Avon, Conn. Eight egg clusters, 50 larvae, and 3 pupae were creosoted and removed from the lumber in this shipment. Forty-eight larvae were removed from a less-than-carload shipment of contractor's materials loaded at Hyannis, Mass., for freight movement to Baltimore, Md. A carload of lumber inspected at Deering Junction, Maine, prior to shipment to Buffalo, N. Y., was found to be infested with 25 larvae and 5 pupae. Nine larvae and 3 pupae were removed from 2 shipments of wooden trellises shipped by a fireworks company at Canton, Mass., to Hackettstown, N. J., and Barton, Vt., respectively. Infestations removed from shipments prior to certification totaled 146 larvae, 16 pupae, and 8 egg clusters.

Pupation and oviposition delayed.--Initial observations of gypsy moth pupation and egg laying this year indicate that these stages are about 2 weeks later than usual. This is attributed to the cold weather in May and early in June, which retarded the hatching of egg clusters and the growth of larvae. The first pupae reported were at Chelmsford, Mass., on July 10 and at Alfred, Maine, on July 18. On the latter date oviposition was quite heavy at Holyoke, Mass. Also on July 18 the first egg clusters were observed at Cape Cod and Chelmsford, Mass.

Defoliation by gypsy moth.--Defoliation was observed by the district inspector at Keene, N. H., in the towns of Charlestown, Swanzey, Winchester, and Westmoreland, N. H., and in Rutney, Rockingham, and Springfield, Vt. Heavy feeding with considerable defoliation was reported in towns along the Maine and New Hampshire coast from Salisbury, Mass., to Kennebunk, Maine. Defoliation by brown-tail moths was also observed in some of these coastal towns.

First-record Dutch elm disease confirmations.--*Ceratostomella ulmi* was cultured from a beetle gallery found in one of the logs from a beetle trap placed in Wilton, Conn., some distance from any known infection. First-record confirmations were reported during the month in the towns of Shelton and Trumbull, Fairfield County, Conn. In Dutchess County, N. Y., confirmations were recorded in the towns of Amenia, Dover, Red Hook, and Rhinebeck. Other New York first records were determined in the towns of Hope and Montgomery, in Orange County, and the towns of Lloyd, Marlborough, New Paltz, and Plattkill, in Ulster County. The Montgomery town confirmation extends the infection zone to within a mile of the Ulster County line. First records reported in Pennsylvania occurred in the townships of Doylestown, Durhan, Middletown, and Northampton, in Bucks County, and the borough of Hellertown, in Northampton County. Discovery of infection on Minisink Island in Sussex County, N. J., extends the border of the infection zone in the northwestern corner of New Jersey to the middle of the Delaware River. Scouts turned up a diseased tree in Hockingport, Athens County, Ohio.

Drought hampers Dutch elm disease scouting.--Exceptionally clear, dry weather during most of July had a retarding effect on the field scouting. Wilting resulting from the dry weather produced innumerable flags that caused the scouts to do an excessive amount of climbing and sampling. Japanese beetles and elm leaf beetles fed heavily on the elm foliage and in some sections completely defoliated the trees, thus adding to the difficulties of scouting. Due to the hazardous fire conditions prevailing, orders were sent out to use extreme caution in burning. Only confirmed trees and beetle-infested material were burned and these were removed to gravel pits and other safe places before they were destroyed.

Temporary lay-off of W. P. A. workers.--In the absence of a definite allotment of emergency relief funds, all security-wage workers were terminated on June 30 until further notice. Per diem scouts and appointed personnel continued their activities straight through the month. W. P. A. workers were recalled in New Jersey on July 10. Work was not resumed by the W. P. A. force in New York until July 14 and 15, and the men in Connecticut did not report back until July 19. At the end of the month there

were 3,369 W. P. A. workers on the rolls, along with 1,620 per diem employees, 68 appointed men, 121 appointees on W. P. A. rolls, and 61 cooperative employees on State pay rolls.

Isolated infection.--Confirmation was received on July 29 of a diseased elm in the township of Fenton, south of the village of Harpersville, Broome County, N. Y. This tree was located by one of the crews engaged in perimeter scouting in the circular strip between the 100- and 150-mile radii from the infection center. This constituted another isolated infection remote from the main infected area.

Progress in Dutch elm disease scouting in Indiana.--Systematic scouting on the first go-over was completed in the Indiana area in July. A second go-over was under way in most of the area in Marion, Hamilton, and Hancock Counties by the end of the month. Six confirmations were reported from the Indianapolis area in July.

Dutch elm disease infection decreased in Essex County, N. J.--There was a definite improvement in the Essex County, N. J., infection. There were 475 twig samples collected for culturing this year up to the middle of July, as compared to a total of 1,019 during the same period in 1938.

FOREST INSECT INVESTIGATIONS

Observations on European spruce sawfly.--P. B. Dowden and W. F. Sellers, of the New Haven, Conn., laboratory, report as follows: "At Marlboro, in southern Vermont, there was a tremendous population of first-generation larvae, which severely defoliated the lower two-thirds of most trees over a wide area. Mortality was light until crowding caused great numbers to fall from the trees. Many of these became weakened and died before they could complete feeding; nevertheless, large numbers formed cocoons. Larvae were counted as they attempted to climb 1 tangle-footed tree. Between June 22 and July 22 about 80,000 were removed. The first new-generation cocoons were observed on July 4 and by July 15 most of the healthy larvae had spun up. The first new-generation adults were observed on July 20. Feeding experiments indicated that first- and fourth-instar larvae could not complete development on 1939 foliage. At the Dublin plot in southern New Hampshire there was also a tremendous larval population with severe defoliation of old foliage. Large masses of larvae congregated at the bases of many trees at this plot. Most of the larvae in these masses died before spinning cocoons. The 4 observation points at Lincoln, in central Vermont, were visited on July 13. At each of these points the sawfly infestation has been greatly reduced. A few dead trees were noted but most trees appear to be in much better condition than in 1938. On July 21 the plot in Township 12, Range 16, in northwestern Maine, was visited. Larval development has been very slow in this area and apparently only 1 full generation will develop this year. Of 100 larvae beaten from the foliage, about 70 percent were in the first and second instars, while only 1 full-grown larva was obtained. Several points were visited late in July in Pittsburg, northern New Hampshire, where the spruce sawfly was observed in small numbers in 1938. The infestation appeared about the same as last year, but most of the larvae were still in the first and second instars."

Forest tent caterpillar in Massachusetts and Vermont.--J. V. Schaffner, Jr., New Haven, reports that in Massachusetts severe infestations of the forest tent caterpillar occurred through the northern half of Berkshire County, especially between Lenox and Williamstown, where thousands of acres of forest growth were from 50 to 75 percent defoliated. Although very few areas were observed where the trees were completely stripped of foliage, the infestation throughout this region was much more extensive than in 1938. In Vermont, in the counties of Bennington, Rutland, Addison, Orange, Windsor, and Windham, where outbreaks have occurred during the last 4 or 5 years, the infestation this year was spotty and generally lighter. Many hundreds of acres of sugar maple orchards and hardwood forests were observed that were from 25 to 50 percent defoliated, but only a few small scattered areas were noted where the average defoliation exceeded 50 percent. One area, however, of 75 to 100 acres on a hillside west of Pawlet Village in Rutland County, was 75 to 100 percent defoliated.

European earwig in Northeast.--Mr. Schaffner also reports that in New Haven, where a few earwigs had been collected in 1938 by the late W. E. Britton, traps were put out to obtain some data on the abundance of the insect. The first examination of the traps was made on July 24 and 156 specimens were obtained.

Young pine injured by tip moth and Matsucoccus scale in New Jersey.--T. J. Parr, New Haven, reports: "Mixed plantations of shortleaf, ponderosa, and red pine on the Belleplain State Forest, New Jersey, were found to be heavily infested with the Nantucket pine tip moth (Rhyacionia frustrana Comst.). This was especially true of the shortleaf pines, which had much of the current growth affected. These insects were in the pupal stage. The pitch pine in both the East and West Plains areas of the pine barrens are extremely heavily infested with the same insect, practically every tip of the current growth being killed back. The insects had already matured in these areas and only a few pupae, apparently parasitized, were collected. If the infested trees are allowed to grow to the point where the stand closes, it appears that there is little further injury from this insect. Matsucoccus gallicolus Morrison was found present on pitch pine generally throughout the whole area. The East Plains area in particular had been heavily infested prior to the last fire, which probably occurred about 6 or 9 years ago, but the present growth is uninfested. The West Plains area examined had also been infested prior to the fires of 1932 and 1936 but not, apparently, as heavily as was the infestation in the East Plains. The West Plains is at present free from the insect, but it appears that it will be only a matter of time before reinfestation from adjoining areas will occur. Apparently, Matsucoccus has in the past been a factor in keeping the pine growth on these plains areas in a stunted condition, as the Nantucket pine tip moth is doing at present."

Developmental period for elm bark beetles.--C. H. Hoffmann, of the Morristown, N. J., laboratory, has been felling elm trees at intervals of 2 weeks to obtain data on the life histories of Scolytus multistriatus Marsh. and Hylurgopinus rufipes (Eich.). A tree cut on April 28 and sectioned on May 15 produced large numbers of H. rufipes beginning July 25, indicating that the total developmental period extended from 71 to 88 days

if the extremes of the exposure dates are considered. The total development of S. multistriatus in a tree cut on May 15 and exposed until May 31 required from 52 to 68 days, while complete development was noted as 38 to 54 days in a tree cut on May 31 and exposed until June 16.

Latent Dutch elm disease infection contaminates elm beetle.--W. D. Buchanan reports the isolation of Ceratostomella ulmi (Schwarz) Buisman from 3 of 247 adults of Scolytus multistriatus Marsh. taken while they were feeding in twig crotches of nursery elms inoculated with C. ulmi in 1938. The beetles were reared from wood known to be free of the fungus. None of the nursery trees were showing wilt symptoms at the time the beetles were removed from the crotches. The fact that beetles can become contaminated with the fungus by feeding on a tree having a latent infection indicates the danger of such trees in an eradication program.

Forest-insect surveys in Northwest.--The entire ponderosa pine region of Oregon and Washington will again be covered by a cooperative survey directed by the Portland, Oreg., laboratory. After a 10-day training period on the Deschutes National Forest, the 12 men employed for the intensive check-plot surveys were divided into 4 parties. Of 170 permanent survey plots the first ones were cruised on July 20. By starting in the lightly infested units and progressing to the heavily infested units, a more complete record of the 1939 loss will be obtained on the most important areas.

Mormon crickets become forest pests.--On the dry lower foothills of the south slope of the Wallowa Mountains, northeast of Halfway, Oreg., a band of Mormon crickets, which according to Supervisor Moncrief covered an area of about 10,000 acres in 1937, extended to more than 125,000 acres in 1939, 50,000 acres being within the boundary of the Whitman National Forest. W. J. Buckhorn, Portland, Oreg. reports that several devastating migrations developed during the spring and early part of the summer. Some of these traveled through forested areas and consumed virtually all green vegetation in their path. The more favored grasses vanished first; next low shrubs were stripped; and then, in areas along the edge of the forest, ponderosa pine reproduction up to 10 or 15 feet in height was defoliated in varying degrees. Some trees were completely stripped, and part of the new-leader growth on twigs and branches was consumed. No doubt this will result in the death of many young trees.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Spraying season reasonably successful despite shortages.--More than 11,000 woodland acres were sprayed for the gypsy moth during June in Vermont, Massachusetts, Connecticut, and Pennsylvania. In addition to the woodland, a large number of residential properties and individual trees were also sprayed. This Bureau also cooperated with the Canadian Department of Agriculture in spraying infested areas in Maine and New Brunswick. The Canadian authorities provided the spraying equipment and crew, while this Bureau furnished the lead arsenate and fish oil used in spraying gypsy moth infestations in the residential sections of Calais and Milltown, Maine. A regular employee of this project supervised the spraying in the Calais area and also directed the spraying operations in St. Stephen, just

across the national boundary in the Province of New Brunswick. This work was completed in approximately 1 week.

Many duties performed by regular gypsy moth field force during the temporary suspension of work by the W. P. A.--The termination of the services of all W. P. A. personnel on June 30 for an indefinite period necessitated the immediate detailing of a large number of the regular gypsy moth field force to various types of work that would ordinarily be performed by temporary workers. Spare trucks and other surplus field equipment were delivered to the storehouses in the New England and Pennsylvania areas. Most of the regular field employees in Pennsylvania were detailed to place assembling cages, baited with attractant to attract male gypsy moths, in selected locations along all trails and highways at 1/4-mile intervals in a group of townships around the known area of infestation. The cages had all been distributed by July 22, and regular visits to each cage were started immediately. All fences around sprayed areas were carefully examined for damage. Several men were detailed to make observations and records of gypsy moth defoliation in New England. In addition, infestations where burlap bands had been applied to trees were patrolled as often as possible.

Resumption of W. P. A. gypsy moth work after temporary suspension.--Gypsy moth work conducted with W. P. A. funds, which was temporarily suspended on June 30, was resumed in New York on July 17. In Vermont, Massachusetts, Connecticut, and Pennsylvania the work was again taken up on July 20.

Effect of new W. P. A. regulation on gypsy moth work.--The new schedule, which requires 130 hours of work per month by W. P. A. employees, resulted in the reduction of working hours in only one State where Federal gypsy moth work is performed. W. P. A. workers in Vermont had formerly been required to work as many as 138 hours per month. In the other States where W. P. A. gypsy moth work is done, the new schedule added from 2 to 10 hours per month.

Efficiency of tree banding impaired by suspension of W. P. A. work.--The benefit derived from banding trees with burlap strips depends entirely on the frequency and regularity with which the burlaps are turned and the gypsy moth caterpillars and pupae killed. This type of work has been done in the past chiefly by W. P. A. workers or other temporary employees. Because of the lack of such employees after June 30, it was impossible to make either frequent or regular visits to all of the burlapped infestations. Regular field employees made visits to burlapped areas whenever it was possible, but the necessity of performing other types of work during this period interfered greatly with the banding work.

Gypsy moth pupation starts early in July.--Numerous observations made in the field during the first week in July indicated that gypsy moth feeding had nearly ceased in the heavily infested areas east of the barrier zone, particularly in Massachusetts and Connecticut. A high percentage of the caterpillars were spinning up and some had already pupated.

Gypsy moth defoliation observed from autogiro.--An annual survey is made in New England to determine the extent and severity of the gypsy moth

infestation in the generally infested area. This work was well under way by July 12, and several of the supervisory employees had completed their survey by July 22; however, in some of the northern sections, particularly in parts of New Hampshire and Maine, this work may not be finished until early in August. In connection with this survey work, an autogiro was piloted over selected areas in Massachusetts and an observer carefully plotted all defoliated sections on topographic maps. The severity of the feeding was also indicated. Several gypsy moth supervisory employees were tried out as observers, while a ground crew traveled by automobile over roads in the same territory and made similar observations. Records will be compared to determine the degree of accuracy with which this type of work can be done by either of these methods.

New gypsy moth infestation found in Connecticut barrier zone.--The discovery of a new gypsy moth infestation in the northwestern portion of the town of Southbury, on the Roxbury town line, was reported by the State Entomologist of Connecticut near the end of June. After viewing the infestation, a regular gypsy moth employee stated that 1 acre of woodland adjacent to the roadside was heavily infested, with 15 to 20 trees defoliated. Some of the caterpillars had pupated, and a large percentage of the remainder had stopped feeding, which made spraying impractical. Several agents were transferred to Southbury to apply burlap bands and crush larvae and pupae found under them or on the trunks of trees within the infested area. During the first week in July these men also crushed moths which had emerged, and creosoted a few newly deposited egg clusters. The town was last scouted with N. R. A. funds in 1934. Based on information obtained to date, the problem of complete eradication of this infestation should not be serious.

W. P. A. gypsy moth workers fight forest fire.--Except for local showers, there has been little relief from the protracted drought that has existed for the last 6 weeks. Several forest fires have been burning in widely separated points in Massachusetts and in eastern New York, and great difficulty has been encountered in fighting them. Most of the mountain streams had dried up, which necessitated the pumping of water from ponds or low-lying bogs through long hose lines to points where knapsack pumpers could be filled and carried to the fire lines. The W. P. A. gypsy moth workers located in Shawangunk, Ulster County, New York, were drafted by the State fire wardens for several successive days to fight a forest fire which by the close of the week ended July 29 had swept over more than 1,000 acres of woodland.

Summary of C. C. C. gypsy moth work during the fiscal year 1939.--The transferring of C. C. C. crews from gypsy moth work to emergency work after the hurricane of September 21 made havoc with the work that had been planned by this Bureau for the fiscal year 1939. At the beginning of the year gypsy moth work was done from 11 different camps located in Massachusetts, Connecticut, and Vermont, but after the hurricane the work was continued from only 2 camps in Massachusetts and 2 in Connecticut, while all C. C. C. gypsy moth work was discontinued in Vermont. The daily average number of enrollees employed on gypsy moth work up to September 21 was 499, but this figure was reduced to 169 from the date of the hurricane to the end of the fiscal year on June 30. A total of over 84,950 6-hour

man-days was taken from gypsy moth work and used on emergency work during this period. During the fiscal year 1939, C. C. C. enrollees scouted more than 25,000 woodland acres and 65 miles of roadsides, and approximately 1,600 of these acres received intensive cleaning and thinning treatment. Work was done in 172 gypsy moth colonies located in 36 towns, and more than 8,800,000 new egg clusters were creosoted or destroyed while burning brush and debris. Approximately 53,000 trees were burlapped, resulting in the destruction of over 3,400,000 caterpillars and pupae. The figures for the burlapping work include parts of 2 different larval seasons, as the caterpillar stage overlaps into 2 fiscal years. The egg-cluster and caterpillar data are obtained by actual count at the lighter infestations, and by estimations when the insects are extremely abundant. In addition to this work, about 1,500 acres of woodland in Connecticut was sprayed with lead arsenate.

Defoliation noted by C. C. C. foremen.--Gypsy moth foremen from all of the C. C. C. camps from which gypsy moth work has been done have spent as much time as could be spared to record defoliation in towns within a reasonable distance from the camps concerned, and supervisory officials also made observations when possible. The most severe and extensive defoliation ever recorded in Vermont was noted in the section around Bellows Falls and across the Connecticut River in New Hampshire; while the heaviest defoliations ever noted in those sections were found in Southampton, Mass., and the surrounding towns, and in parts of Granby, Sinsbury, Canton, and Barkhamsted, in Connecticut. Lesser defoliation occurred in many other towns. The "wilt disease" was quite prevalent in some locations and has been responsible for the destruction of large numbers of gypsy moth larvae. Imported parasites have also destroyed many of the caterpillars.

Spraying gypsy moth infestation in Connecticut.--The outstanding C. C. C. gypsy moth work for the month of June was the woodland spraying in the heavily infested Granby-Sinsbury-Canton area in Connecticut. Approximately 22½ tons of lead arsenate, with fish oil, was used on an area of about 1,523 acres.

Heavy gypsy moth infestations in Massachusetts inspected.--A meeting of members of the Timber Salvage Administration of Massachusetts, the Conservation Department of Massachusetts, and the C. C. C. was held at the Federal Gypsy Moth Office in Greenfield, Mass., and in the field on July 14. The members of this group were given a resume of this project and were shown about the U. S. D. A. buildings in the morning. During the afternoon they examined several large severely defoliated areas in Northfield, Bernardston, Holyoke, Southampton, and adjoining areas. They were shown heavy infestations where no work had been done, and other areas that had been treated and were therefore in much better condition than the surrounding territory, were described to them.

PLANT DISEASE CONTROL

Stem rust caused little damage in 1939.--The season of 1939 has been a very light rust year in general, according to E. C. Stakman, of the Federal rust laboratory, St. Paul, Minn. Winter wheat was damaged very little, on the whole, the aggregate loss not exceeding a trace plus. Spring wheat also was damaged very little, heat and dry weather causing premature

ripening of the grain so that the relatively small amount of inoculum distributed in May and June did not have time enough to increase very much. In Minnesota there was only a negligible amount of susceptible spring wheat grown this year. An increase in rust-resistant varieties in South Dakota and North Dakota, together with heat and dry weather, were important in preventing heavy rust development. Rust was a negligible factor on the whole, except for an area in southwestern North Dakota between Dickinson, Mott, and Richardton, where Ceres constituted from 60 to 75 percent of the acreage and where premature ripening due to heat and dry weather was not so pronounced as in most of the other sections of the State.

Survey work progressing in northern Michigan counties.--Crews of laborers have been making progress in intensive survey work in the northwestern part of the Lower Peninsula. Seven of the counties bordering on Lake Michigan, namely, Antrim, Benzie, Charlevoix, Grand Traverse, Leelanau, Manistee, and Emmet, have been considered as having more escaped barberry bushes than any other similar group of counties in the State, according to Francis B. Powers, in charge of barberry-eradication work in that State. The first survey work in these counties was done during the years 1923 to 1926. There are many large orchards in this section and many inland lakes, as well as popular resort sections along the lake shore. Approximately one-sixth of the land in these seven counties is devoted to general farming, rye and oats being the principal crops. Early nurserymen combined the sale of barberries to owners of shore property with the sale of fruit trees to orchard owners, often giving barberry bushes as premiums with purchases of trees and other shrubs. Much of the territory back of the shore line and orchards is heavily wooded or cut-over timber land overgrown with brush. All these factors have combined to make this an ideal location for the spread of barberries by birds and small animals. Deer hunters and trout fishermen have reported common barberry bushes in isolated spots. The crews of laborers working in Leelanau, Benzie, Grand Traverse, and Antrim Counties during 1938 and until the end of June this year have inspected 159 square miles of territory and have destroyed more than 15,400 barberry bushes and seedlings on 194 properties. Most of the bushes eradicated this season were from 2½ to 6 feet high and approximately 7 percent of the larger bushes were bearing fruit.

Blister rust control work in Northeastern States.--Control work during May and June in the Northeastern States resulted in 271,346 acres being cleared of 5,882,640 wild and 7,071 cultivated Ribes bushes. These activities gave 73,406 man-days employment to over 3,000 workers. Over 68 percent of the total acreage examined was in connection with projects carried on under the W. P. A. program. C. C. C. personnel was assigned to Ribes-eradication work from 43 camps during May and 58 camps in June, chiefly in New York and Pennsylvania. Control activities under the C. C. C. program in New England were drastically curtailed this spring, owing to the urgency of projects for reduction of forest-fire hazards in the sections affected by the hurricane of September 1938. In cooperation with the National Park Service and the Forest Service, control work was carried on in Acadia National Park in Maine and in the White Mountain National Forest in Maine and New Hampshire.

Girl scouts eradicate Ribes bushes.--Agent Cramer reports that 15 girl scouts from Camp May Flather at Mount Solon, Va., in the George Washington

National Park, eradicated 141 R. cynosbati bushes. Last year the older girls from this camp helped destroy Ribes plants under the supervision of Agent Cramer, helping to protect from blister rust the forest they were enjoying and fulfilling the Girl Scout precept of returning compensation for benefits received.

Scouting for blister rust in sugar pine region.--Scouting for blister rust has been carried on recently on the Klamath National Forest in places where Ribes infection was prevalent in 1937. Ribes infection was found on the East Fork of Indian Creek at the old infection center located in 1936. On Grider Creek, where there was Ribes infection in 1937, Mr. Lachmund found 1 small sugar pine with 4 incipient cankers, 1 of which had produced pycnia this year. Inspection of the infection center on the East Fork of Indian Creek above Happy Camp showed that infection on pines now extends at least $\frac{1}{2}$ mile down stream and several hundred feet up the slope to the east from the original center. The infection grades out on smaller sugar pines to about 1 tree in 10 infected at the edges of the area. Similar conditions of infection probably occur upstream from the center and up the west slope. The cankers are principally of 1935 and 1936 origin, with a few incipient ones probably of 1937 origin. In view of the enormous increase in the production of aeciospores over that of 1936 and 1937, the infection on Ribes along Indian Creek is not so great as might be expected. It appears that at the time of aeciospore dissemination this year, climatic conditions were not favorable for Ribes infection. No infection on Ribes was observed downstream from the old center for 2 or more miles, although well over 100,000 leaves of R. bracteatum and several thousand of R. sanguineum were examined. Messrs. Lachmund and Crowell are now scouting for the rust on the western slope of the Lassen National Forest in the vicinity of Viola.

Security-wage earners employed on blister rust control.--Plans for the W. P. A. program in the Northeastern States during the period July 1 to September 30 provide for the employment of nearly a thousand security-wage workers on Ribes eradication. Personnel reports received from the field indicate that practically the full quota of men was employed during the latter half of July. In addition, Ribes-eradication work will be performed from about 58 C. C. C. camps from the first of July to the middle or end of September. A State W. P. A. project, employing about 38 men, will be resumed in Connecticut on August 1. In New Hampshire and Maine several towns have appropriated funds for control work and the county of Saratoga, N. Y., is providing \$12,000 for this work. In most of the Northeastern States local control work is also being carried on to some extent in cooperation with individual owners.

Ribes infection in Northeastern States.--Exceptionally dry conditions have prevailed throughout the Northeastern States for the last several weeks. At Boston, for example, the total precipitation during July was 0.75 of an inch, as compared to a normal average of 3.49 inches. Notwithstanding the drought, many reports have been received of heavy blister rust infection on Ribes. State Leader Newman of New Hampshire says that the most heavily infected Ribes americanum he has ever observed were recently located on the property of the Manchester Water Board. This species is usually lightly infected. Mr. Calderara also reports heavy infection on such bushes in Saratoga and Warren Counties, N. Y., and further states that all species of Ribes

that he has seen this year were heavily infected. State Leader Perry of Massachusetts found Ribes heavily infected in Hampshire County.

Blister rust exhibit attracts attention at summer festival.--L. E. Nelson, of the Milwaukee, Wis., blister rust office, reports that an active interest was taken in the blister rust control exhibit at the Milwaukee Midsummer Festival in July. It was estimated that during the 9 days of the festival approximately 150,000 people saw the exhibit. Keen interest was denoted by the number of questions asked by visitors regarding blister rust. Over 12,000 blister rust leaflets were distributed to persons interested in blister rust control.

COTTON INSECT INVESTIGATIONS

Relation of other hosts to thrips on cotton.--E. W. Dunnam and J. C. Clark, Stoneville, Miss., have been giving attention to the species of thrips found on cotton, the relation of other host plants to their abundance, and varietal resistance or tolerance of cotton to thrips. Collections of thrips were made in the spring of 1936 on 40 commercial varieties of cotton and the species determined as Frankliniella tritici Fitch, F. fusca Hinds, F. runneri Morgan, and Sericothrips variabilis Beach. In 1937 a population study was undertaken by collecting 20 buds from each of 46 varieties of cotton on June 1 and June 15. The terminal bud samples from each variety were placed in a tightly woven cloth drawstring bag, immersed in gasoline, the thrips counted under binoculars and placed in 70-percent alcohol. This method of making population counts proved very practical but Dudley Moulton, of California, and Floyd Andre, of the Division of Insect Identification, of this Bureau, who made the determinations, stated the specimens were in poor condition and in some cases could not be determined beyond the genera. This suggests that gasoline should not be used and that the 70-percent alcohol used for the preservative should be used for killing these insects. In addition to the 4 species listed above, F. cephalica Crawf. and Thrips tabaci Lind. were found on cotton in 1937. For the June 1 collection on cotton from the variety field the population ranged from 7 to 55 per 20-bud sample, or an average of 1.5 thrips per terminal bud. Similar samples from cotton growing near an alfalfa field averaged 2.2 thrips per bud and near a fence row covered with perennial sweet peas 14 thrips per bud were found. In the June 15 collection from the same 46 varieties, following a heavy rain, the numbers per sample ranged from 4 to 18, or an average of 0.5 thrips per bud. None of the varieties of cotton were found immune to thrips, although some varieties appeared to be less damaged and fewer terminal buds were killed than in others. A survey was also made to determine what cover crops and other plants were infested with thrips which might later transfer to cotton. Twenty-bud samples were collected and handled similar to the cotton samples. Nine species of plants were found to be infested with one or more of the following species: F. tritici, F. fusca, F. cephalica, T. tabaci, and T. (Microcephalothrips) abdominalis Crawf. The last-named species was not found on cotton and F. runneri and S. variabilis, which were on cotton, were not found on the other plants examined. F. tritici, the most abundant species, was found on flower buds and blooms of the perennial sweet pea, on Austrian pea blooms, hairy vetch blooms, alfalfa buds, Erigeron sp. or horseweed, cultivated roses, Amaranthus sp., and

milkweed. F. fusca was found on Austrian pea blooms and F. cephalica on thorny amaranth. T. tabaci was found on perennial sweet pea flower buds and horseweed. T. abdominalis was found on horseweed. The populations of all species on cover crops and other plants ranged from 1 to 125 thrips per bud or bloom as follows: Perennial sweet pea blooms, 125; hairy vetch, 100; white clover blooms, 13; rose buds, 12; Austrian pea blooms, 8; alfalfa terminal buds, 4; milkweed blooms, 1.5; horseweed terminal buds, 1.5; thorny amaranth, 1.0; and horseweed, 1.0. The thrips damage to young cotton is becoming more serious in the Mississippi Delta as a result of the more extensive use of hairy vetch and Austrian peas as winter cover crops.

Extract from castor bean plant not toxic to boll weevil and cotton stainer.--At Brooksville, Fla., an extract from the castor bean plant is being developed for insecticidal purposes. It is prepared in two forms--liquid and dust. This castor bean extract was reported as "a combination stomach and contact insecticide and as being effective in controlling nearly all of the common citrus pests." To determine if this castor bean extract has any value for use against cotton insects, C. S. Rude, Gainesville, Fla., conducted several tests in June against the boll weevil and the cotton stainer, Dysdercus suturellus (H. S.), using the liquid extract at the rate of $\frac{1}{2}$ pint and 1 pint to 2 gallons of water. This material was found to have no toxic effect on the boll weevil or the cotton stainer and to be of no value as an insecticide for use against these insects.

Effect of burning woods on boll weevil.--Information on the effect of burning over woods on the abundance of boll weevils was reported by F. F. Bondy, Florence, S. C. Weevil counts were made on 4 cotton fields adjacent to burned woods and in 4 adjoining fields adjacent to unburned woods. In 3 counts made at weekly intervals from June 1 to 15, the average for the 4 fields near the burned woods was 48 weevils per acre, and for the 4 fields near the unburned woods 65 weevils per acre. The average square infestation during the latter half of June was 4 percent in the fields near the burned woods and 7 percent in the fields near the unburned woods, and had increased to 47 percent and 60 percent, respectively, by the end of July. The records indicate that the boll weevil infestation near burned woods is less than it is near unburned woods, but the difference is not great enough to warrant the general burning of woods for the destruction of hibernating weevils. Previous investigations have shown that most of the weevils hibernate within 100 feet of the edges of the woods.

Dusting more effective than mopping during presquare stage for boll weevil control.--R. L. McGarr, State College, Miss., reports that on June 9 two small cotton fields were dusted with calcium arsenate and two others were mopped with a mixture of 1 pound of calcium arsenate to 1 gallon of water. Rain washed off most of the poison after about 48 hours. At the time the fields were treated there was a very uniform infestation of weevils in the four treated fields and in the four untreated check fields. The average infestations in these fields 2, 3, and 4 weeks after treatment were as follows:

Period after treatment (weeks)	Infestation in fields			
	Untreated:		Untreated	
	Dusted	check	Mopped	check
	Percent	Percent	Percent	Percent
2-----	6.8	31.0	13.5	19.8
3-----	16.2	31.2	25.8	30.0
4-----	10.5	25.8	15.7	19.7

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Situation in the lower Rio Grande Valley.--The area in Texas referred to as the "lower Rio Grande Valley" consists of Cameron, Hidalgo, Starr, and Willacy Counties, and that portion of the valley in Mexico, lying directly across the Rio Grande, is usually referred to as the "Matamoros area." This fertile valley constitutes 1 general cotton-growing area, and was brought under Federal regulation by the 2 countries, United States and Mexico, in 1936 on account of the discovery of pink bollworm infestation. There is a considerable increase in infestation in Cameron County this year, as was indicated early in the season by bloom and boll inspection of the 1939 cotton crop. Gin-trash inspection was begun in the lower Rio Grande Valley district on July 6, and 5,234 pink bollworms had been taken from 1,096 bushels of trash in Cameron County by the end of July, but only a few incipient infestations had been found in the other three lower valley counties. Some fields in Cameron County near the river were heavily infested. Trash from a bale of cotton from 1 of these fields yielded 1,081 specimens of the pink bollworm. A 25-pound sample of seed cotton originating from another heavily infested field was placed in the hot sun for 3 hours and 62 pink bollworms emerged therefrom during that time, indicating that there were at least 2,200 pink bollworms in seed from this bale of cotton. Inspection was completed in Cameron County during July. In the Matamoros area of Mexico, 380 bushels of trash was run for the period, in cooperation with Mexican inspectors, and 7,482 pink bollworms were found, which indicates a decrease in infestation in that district as compared to the 1938 season. At the end of July 56,992 bales of cotton had been ginned in the lower Rio Grande Valley district, this being two-thirds of the estimated 90,000-bale crop for this season. An intensive field clean-up campaign is expected to begin in this district during the first week in August. The sum of \$460,000 has been made available for use in an effort to control the pink bollworm in the lower Rio Grande Valley and Coastal Bend districts, the latter area lying directly adjacent to the lower Rio Grande Valley district. It is planned to use such portion of these funds as may be necessary to clean and burn the cotton debris from the most heavily infested area. After deducting the necessary amount to be used in the heavily infested area, the remainder of this fund will be spent in cooperating with farmers in adjacent areas to clean their fields of live cotton plants as required by the State regulations.

Coastal Bend area.--The Coastal Bend district lies directly north of the lower Rio Grande Valley, and is composed of the counties of Brooks, Kleberg, Nueces, Jim Wells, and Kenedy. This area was brought under regulation in 1938 on account of the discovery of a light pink bollworm infestation,

which apparently spread from the lower valley district. Three bales of cotton were ginned in the Coastal Bend district during the last 3 days of June, and at the end of July 36,711 bales of cotton had been ginned. Inspection of gin trash was begun in that area about the middle of July to determine whether or not pink bollworm infestation still existed in that area and if so to what extent. At the close of July approximately 3,500 bushels of gin trash had been inspected with negative results. Examination of such material was to be continued through the greater part of August. Sterilization of seed as a continuous process of ginning was not required for that district by the State for the 1939 cotton crop, but this practice was strongly recommended by the Bureau. Considerable opposition was expressed by ginners and oil millers to this procedure on account of the high cost of sterilization machinery, as well as the added moisture to the cottonseed for that particular area, in which it was claimed the seed was already too moist. However, in order to comply with Quarantine 52, ginners found it more convenient to install sterilizers in gins, and definite arrangements were begun early in June to carry out such measures. Concurrent with the controversy regarding installation of sterilizers at gins, efforts were begun in this Division to develop a sterilizer that would overcome objections to installation of sterilizers advanced by ginners and make the regulation imposed less burdensome. As a result, a dry-heat sterilizer was developed that could be built at a moderate price, overcoming the two principal objections to installation of sterilizers in gins, and these machines have proven very successful under actual ginning operations for some time. At the end of July the 71 gins operating in that district had been equipped with sterilizers and were operating as a continuous process of ginning. Thirty-five of these were the new dry-heat machine, the rest being various other models.

Thurberia-plant eradication.--Thurberia-plant eradication, which has been carried on in various mountain ranges in southern Arizona for the last several years through funds provided by the Work Projects Administration, supplemented by funds allotted by this Bureau, was resumed on July 20 after a few weeks' cessation pending allocation of funds for this work. Activities were begun with a crew of 50 laborers, and the first 4 days were utilized in bringing to a close the eradication work which had been in progress for several months in the area south of Continental, in the Santa Cruz Valley. On July 25 work was begun in the Tortillita Mountains. This range was worked in 1935 and 1936 when the eradication of Thurberia plants was first begun, and a rechecking of this territory is considered important in order to determine whether or not plants were missed and to remove any seedlings which have developed during the interval. At the end of July 3,200 acres had been covered and 18 large plants, 122 small plants, 1 stub plant, and 5 seedlings had been located and destroyed. The area being covered in the Tortillitas is exceptionally rough and close search is difficult.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Beet leafhopper abundance in different parts of Intermountain region.--As a result of surveys made by J. R. Douglass and his associates at the Twin Falls, Idaho, laboratory, it has been determined that the abundance

of Eutettix tenellus (Bak.) in 1939 varies greatly in the different critical areas of the Intermountain region. A survey of beet fields in south-central Idaho made during the first part of June revealed an average of 5.4 E. tenellus per 100 feet of beet row, as compared with 24.4 individuals for the corresponding period in 1938. This condition confirms pre-season statements issued during the month of May, of probable beet leafhopper populations for this district. A separate survey of the desert breeding areas of southern Idaho and eastern Oregon, made during the period April to June, with the objective of determining the abundance of overwintered beet leafhoppers and the distribution and abundance of spring-breeding host plants, demonstrated that the leafhoppers were not uniformly distributed over these areas but were found concentrated on small patches of susceptible host plants, including green tansymustard, flixweed, and peppergrass. These host plants occurred only sparsely throughout the area and were in poor condition, owing to temperatures above normal combined with deficient precipitation. In general, the beet leafhopper population was very low in southern Idaho, medium in western Idaho, and high in eastern Oregon. A survey of beet fields and overwintering E. tenellus in the Nyssa, Oreg., and Toppenish, Wash., districts revealed the presence of overwintered individuals in all fields examined. The infestation per field in the Oregon area ranged from 8 to 24, with an average of approximately 15.6, and in the Washington area it ranged from 3 to 37, with an average of approximately 13.0 per 100 feet of beet row. A survey of the Billings, Mont., area for overwintered beet leafhoppers disclosed the highest carry-over population on record. The infestation extended up the Yellowstone River Valley from Custer to Columbus, a total distance of 96 miles. Incidentally this survey brought forth the fact that Russian-thistle and several species of wild mustard were growing abundantly in the area surveyed. Surveys of beet fields in western Idaho and eastern Oregon late in May to determine the population of the spring generation of E. tenellus disclosed an average of 0.66 per beet, which is considered a very low infestation. The presence of fourth- and fifth-instar nymphs in the fields demonstrated that the overwintering adults, which had entered the fields early in the season, had oviposited in the young plants.

Effect of temperature on pyrethrum-oil sprays used against beet leafhopper.—F. H. Harries and J. D. DeCoursey, Twin Falls, report that recent laboratory studies to determine the effects of temperature and humidity on the insecticidal action of pyrethrum-oil sprays against E. tenellus demonstrate that temperature exerts an important effect. It was found that the percentages of leafhoppers killed are higher at comparatively low ranges of temperature (60° F.) than at higher temperatures (100°). The accumulated data exhibited a distinct trend toward greater mortality of E. tenellus when the insecticide was applied at relatively low humidities, although the differences were not always statistically significant. It was also determined that only a low percentage of E. tenellus mortality could be attributed to the presence of spray residue on the treated plants, but that the spray residues present on the interior of the cages exerted an important effect on the mortality of the insects.

Dough balls attractive to wireworms infesting tobacco.—In an experiment conducted by J. U. Gilmore, W. A. Shands, and J. T. Connor, of the Oxford, N. C., laboratory, to determine the relative attractiveness to wireworm larvae of several materials, including diced Irish potatoes and dough

balls made of wheat middlings, wheat flour, and fine wheat bran, it was found that the dough balls of the wheat products attracted far more wireworms at the end of 1 week than did the potatoes and that a higher percentage of the dough-ball samples were infested. The same relationship existed at the end of 2 weeks, but it was less pronounced. Apparently many of the larvae that had been attracted to the dough balls during the first week deserted them by the end of the second week. Potatoes showed a slightly higher infestation and higher percentage of infested samples at the end of 2 weeks in the soil. Basing the intensity of larval concentration to the dough balls on the larval population found in a nearby plot, the average increase in wireworm population in a circular area of $1/4$ square foot and 6 inches deep, centered around each buried dough ball, were 329, 341, and 300 percent for wheat middlings, wheat flour, and fine wheat bran, respectively, whereas potatoes showed an increase of 60 percent. The wireworms involved in these studies consisted principally of two species, tentatively identified as Conoderus vespertinus (F.) and C. lividus (Deg.), which were causing injury to newly set tobacco plants.

Dichloroethyl ether gives promising results against raspberry root borer.--W. W. Baker and B. J. Landis, of the Puyallup, Wash., laboratory, have obtained promising results in the use of dichloroethyl ether in combating the raspberry root borer (Bembecia marginata (Harr.)), when directed against this insect in its winter hibernaculum in bush blackberries. The dichloroethyl ether has given better results than any other material experimented with, including various combinations of oil and nicotine. Best results were obtained by plowing up the soil around the bases of the plants to heights of 5 or 6 inches above the general soil level in order to retain the dichloroethyl ether in close proximity to the hibernacula for a sufficient duration of time to allow the penetration of the dichloroethyl ether through the covers of the hibernacula. The applications were made during the period between November 1 and March 1, as the B. marginata larvae ordinarily begin to come out of hibernation and start attacking the new buds of the host brambles approximately the middle of March. The dichloroethyl ether was used at the dilution of 15 cc. per gallon of water, and thus far no detrimental effects to bush blackberries from this treatment have been noted. Two different types of conditioning agents were used with the dichloroethyl ether. One of these consisted of a spreader and penetrant, while propylene glycol was also used in some of the tests because of its compatibility with dichloroethyl ether and because of its penetrating character. It is apparent that these conditioning agents assisted in getting the material in contact with the B. marginata larvae.

Corn meal and zinc phosphide effective against mole cricket.--As a result of recent laboratory tests with various poisoned baits against Scapteriscus spp., J. N. Tenhet, of the Sanford, Fla., laboratory, reports that corn meal and zinc phosphide moistened with water was the most satisfactory of any of the baits tested. Combinations of wheat bran, corn meal, oatmeal, dried blood, and sheep manure, with zinc phosphide, sodium fluosilicate, cryolite, and tartar emetic were tested both when moistened with water and when moistened with a highly refined mineral oil. The general conclusions drawn from this experiment, other than that mentioned above, were that poisoned baits moistened with water were more attractive than and equally as effective as baits moistened with oil. Sodium fluosilicate baits

were second in effectiveness to the zinc phosphide baits, but were much less attractive. Cryolite and tartar emetic gave unsatisfactory results as poisons against mole crickets, while dried blood and sheep manure were not satisfactory as foods.

Nicotine-hydrated lime dust mixture more effective against cabbage aphid than dust mixtures containing rotenone with various conditioners.--N. F. Howard and R. H. Nelson, of the Columbus, Ohio, laboratory, report that results of field tests against Brevicoryne brassicae (L.) in southern Ohio indicate that a nicotine-hydrated lime dust mixture containing 2.4 percent of nicotine is much more toxic to this species of aphid than dust mixtures containing 1 percent of rotenone derived from cube and containing either sodium oleyl sulphate or peanut oil as conditioners, with talc as the diluent, or a cube-dust mixture composed of equal parts of finely ground dusting sulfur and tobacco dust. Although the final data from the plots where cube-dust mixtures were applied indicated a slight degree of reduction of aphid populations in the treated plots, as compared to similar untreated plots, it appeared that none of the dust mixtures containing cube gave satisfactory control of the aphid. Good control was obtained, however, by the application of dust mixtures of nicotine with hydrated lime.

FOREIGN PLANT QUARANTINES

Mediterranean fruitfly intercepted in packing material.--A customs examiner at the port of Baltimore, Md., while inspecting a small registered-mail package containing green coffee, ground coffee in vials, and 32 green coffee berries from Brazil, addressed to a local consignee, noticed an adult fly and a pupa in some medicated cotton used as packing material. The living adult had apparently emerged in transit and was found in a corner of the box entangled in the cotton. Both the adult and pupa were identified as Ceratitis capitata Wied.

Large numbers of Mexican fruitfly arriving at border ports.--On June 15 an American boxcar arrived in the Juarez yards of the National Railways of Mexico loaded with mangoes in bulk. Approximately 700 larvae of Anastrepha ludens Loew were taken from this car of mangoes. An empty boxcar recently inspected in the railway yards at Nuevo Laredo contained a few discarded mangoes. When this car was cleaned an examination was made of the fruit and approximately 50 percent contained anywhere from 1 to 12 larvae of this fruitfly.

Prohibited plant material from Jamaica.--On May 3, a passenger arrived at New York on the S.S. Jamaica from Kingston, Jamaica. The baggage declaration prepared by this passenger listed nothing of plant-quarantine interest. The customs inspector assigned to the inspection of this individual's baggage had his suspicions aroused by the small capacity of a certain trunk. A close examination revealed that this trunk had a false bottom under which were found 18 nodes of sugarcane, 6 mangoes, 3 yams, 1 pound of banana leaves, and some restricted plant material consisting of 1 cocoa bean pod, 12 coconuts without the husks, 12 plantains, 10 yautias, 1 pound ginger root, and 1 pound shelled corn.

Pink bollworm intercepted in baggage from Sicily.--On July 20 six cotton bolls were taken from the baggage of a passenger arriving on the . .

S.S. Rex. Two living larvae of the pink bollworm were found in cotton seeds taken from these bolls. The passenger stated definitely that the origin of the cotton seeds was Sicily.

Citrus canker with U. S. oranges.--Citrus canker was found on one of five Japanese oranges mixed with about a hundred of United States origin in the stores of a Norwegian vessel at Seattle on July 5. This is another incident proving that the old saying, "Things are not always what they seem," is still applicable in inspection work. Incidentally only four interceptions of citrus canker were made during the fiscal year 1939, apparently the lowest record for 10 years or more.

Entomological interceptions of interest.--Twenty-five living larvae of the trypetid Anastrepha sp. were intercepted at New Orleans on March 20 in one fruit of Passiflora sp. in passenger's quarters from Costa Rica. Six living larvae of the melon fly (Dacus cucurbitae Coq.) were intercepted at San Francisco on April 17 in a cucumber in ship's stores from Hawaii. Two living larvae of the West Indian sweetpotato weevil (Euscepes postfasciatus Fairm.) were taken at Boston on April 6 in yams in baggage from Jamaica. Five living specimens of the cydnid Allocoris incognita McA. & M. arrived at Brownsville, Tex., on March 28 on snapdragons in baggage from Mexico. Specimens of the scale insect Chrysomphalus paulistus (Hempel) were intercepted at New York on March 29 on a grape berry in cargo from Argentina. A living larva of the weevil Brachyrhinus rugosostriatus (Goeze) was found at Seattle, Wash., on March 23 with soil around the roots of rhododendron in cargo from Canada. A living specimen of the pentatomid Platycarenum humilis (H. S.) was taken at Galveston, Tex., on April 3 with banana debris in cargo from Mexico. Four living larvae of the pink bollworm (Pectinophora gossypiella Saund.) arrived at New York on April 19 in cottonseed in the mail from Jamaica. A living adult of the chrysomelid Platycycla deruta (Boh.) was intercepted at Laredo, Tex., on April 29 on a banana in cargo from Mexico. A living specimen of the lygaeid Nysius monticola Dist. was taken at El Paso, Tex., on February 20 on cabbage in baggage from Mexico. Living specimens of the scale insect Aspidiotus herculeanus D. & H. were collected on March 7 on Phoradendron randiae in the field at Arecibo, P. R. Living adults of the chrysomelids Aphthona ovata Foud. and Lema cyanella (L.) were intercepted at Washington, D. C., on March 13 with forest litter used as packing for shrubs in the mail from Poland.

Pathological interceptions of interest.--Botrytis allii M. T. Munn was found on onion bulbs from Finland on March 9 at New York. Clithris quercina (Pers.) Rehm. was intercepted on April 20 at Washington, D. C., on oaks from Germany. Coryneum sp., no species reported on host, was found on leaves of Pyracantha sp. in cargo from Canada on March 29 at Seattle. Diatrypella sp., no species reported on host, was found on February 17 on Polyscias guilfoylei from Bermuda at New York. A badly spotted lemon from Italy taken at New York on July 20 was found to have a fungus developing on the spots and producing tiny two-celled dark spores of the Diplodia type. Heterodera marioni (Cornu) Goodey was intercepted at San Francisco on June 30 in Mammillaria bombycina, Gynocalcium denudatum, and G. platanense from Japan and on July 14 in Sedum sp. from Costa Rica. Phoma russelliae Trav. & Spessa was intercepted on November 10, 1938, at New York on a plant of Russelia equiseti in baggage from Syria. Phyllosticta saccardoi Thum. was intercepted on rhododendron plants in cargo from Germany on

March 29 at New York. Physalospora pandani E. & E. was found on a Pandanus sp. plant in baggage from Bermuda on March 6 at New York. Pleospora sp., no species reported on host, was intercepted on one of the leaves of Pyracantha sp. in cargo from Canada on March 29 at Seattle. Pucciniastrum myrtilli (Schum.) Arthur was intercepted on rhododendron plants in baggage from Canada on June 26 at Seattle. Arthur's manual does not list this rust on any species of Ericaceae in western North America. Sclerotium sp., with sclerotia unlike those of S. gladioli Massey, was found on a gladiolus corm in a lot of 50 in baggage from Holland on December 15, 1938, at New York. Septoria lepidii Desm. was intercepted on leaves of Lepidium campestre on July 14, 1938, at Chicago in mail from the Union of Soviet Socialist Republics.

DOMESTIC PLANT QUARANTINES

Grasshopper control reaches peak early in July.--The early maturity of grasshoppers brought on the high point of control operations, particularly against migratory forms, earlier than usual. This resulted in a peak of effort to control the hoppers before winged migrations developed.

Grasshopper control in the long-winged migratory area.--In the contiguous parts of Colorado, Kansas, New Mexico, Oklahoma, and Texas, where heavy infestations of Dissosteira longipennis Thos. had prevailed, control operations were so effectively carried out that they were largely completed by mid-July. Populations were so depleted over most of the area by that time that not more than two or three grasshoppers per square yard could be found. Baiting crews were discontinued and plans made to rebait, at a later date, areas where straggling hoppers of this species would congregate for egg laying. Flights of this species have been rare. Minor flights developed from rough and inaccessible areas on the border of Colorado and New Mexico. Late in July and early in August baiting of egg-bed congregations of D. longipennis was in progress in Colorado, New Mexico, and Texas.

Grasshopper control in the lesser migratory area.--Early in July most of Melanoplus mexicanus Sauss. had reached the adult stage and egg laying had begun in the southern half of its range. Dispersing flights developed with depletion of populations on idle, abandoned, and range land to such a degree that further baiting thereon was unwarranted. The Federal idle-land baiting crews were assigned for a short period to assist farmers in protecting crops, on which migrant hoppers had settled, until harvesting halted baiting by farmers. No mass, long-distance migrations occurred and no extensive crop damage has been done. In limited areas relatively heavy damage has occurred, but these areas are negligible as compared to the vast acreage of crops protected. Some baiting is expected after harvest for the protection of row and late-forage crops.

Grasshopper survey planned.--Late in July a conference of general supervisors was called to develop plans for the adult and egg surveys. The adult survey was started early in August.

Mormon cricket control activities slacken.--Control operations against Mormon crickets, which started earlier than usual in the 11 Rocky Mountain and northern Great Plains States and reached a peak at mid-June, drew rapidly

to a close in July because of slackening of migrations and scattering of crickets. With the exception of several counties in Idaho, Nebraska, Nevada, Oregon, and Wyoming, where control was still being conducted intensively on a small scale, field control was completed by the end of July. Small crews of workers were continued to dismantle and roll metal barrier and to clean dusters for winter storage.

Mormon cricket adult and egg survey.--With the termination of control work, supervisors were turning their attention to the adult and egg survey, upon the results of which will depend the estimated needs for control work in 1940. As usual, decided variation exists as to the proper season for surveys, particularly on account of land elevations.

Range damage by Mormon crickets.--The extensive acreage of infested land has necessitated restriction of Mormon cricket control activities to crop protection. Considerable damage is reported this season on range land in Clark and Owyhee Counties, Idaho, and in Baker County, Oreg. In the last-named county, Division of Grazing representatives estimate destruction of 1 ton of range forage per acre on 250,000 acres of range.

Natural enemies of Mormon cricket adults and eggs.--Among those observed preying on adults and digging up cricket eggs were the American magpie, Mexican raven, chicken hawk, porcupine, blackbird, red-shouldered hawk, red-tailed hawk, squirrel, chipmunk, ground squirrel, marmot, curlew, catfish (where crickets were crossing the Missouri River, Mont.), horned lark, western meadowlark, mourning dove, field mice and rats, pinyon jay, western robin, California gull, and vesper sparrow. Palmodes laevis Cress. became increasingly more abundant in various districts of the region.

White-fringed beetle control at peak.--The high point of control work against this insect continued through July and into the early part of August. Adult emergence extended through this period, failing to occur in "peak" form as in 1938, apparently because of climatic conditions. Tapering off of control work has permitted release of some personnel to survey operations in and near known infestations.

Spraying and dusting for white-fringed beetle control.--Spraying with herbicide of railway rights-of-way, waste land, and other places has attracted the attention of public and railway officials to the possible use of this inexpensive material for weed killing on highways, railways, and for sanitation purposes. More than 1,200 miles of trackage in addition to other areas have been denuded of vegetation to kill beetles and destroy food plants. Excessive almost daily rains during the period, exceeding 20 inches at Florala in July, have necessitated such frequent applications of calcium arsenate and cryolite dust that local wags at New Orleans and Florala have dubbed those areas "the dust bowl." Nevertheless, except in limited areas cropped to legumes on which calcium arsenate is impractical, the outstanding feature of the control program has been the very satisfactory population suppression, extending in some areas of high populations to 99-percent control, as indicated by field observations.

Slight extension of white-fringed beetle infested area.--The lightly infested area at Pensacola, Fla., was extended early in August along the railway tracks about 1/2 mile, involving an area of about 10 city blocks.

Infestation in this new area did not exceed 3 beetles per acre and connects an outlying isolated area to the main infestation. Immediate intensive control operations were directed at the new area.

Modification of white-fringed beetle quarantine restrictions.--The third revision of B. E. P. Q. 485, effective July 28, 1939, extends the period of exemption from certification to February 1, 1940, of several restricted commodities when consigned from Saint Bernard Parish, La.

Sweetpotato weevil inspections in western Texas and New Mexico.--In accord with plans for 1939 inspection, the area around El Paso and contiguous portions of New Mexico near Las Cruces, in the Mesilla Valley, were inspected and no weevils were found. In the El Paso Valley, where plans are being made for increased acreage, 30 inspections were made between El Paso and Fabens. Principal growing points are now at Ysleta and San Elizario.

Peach mosaic and phony peach inspections.--Having completed inspections of nurseries and budwood sources and their environs by the end of June, attention was directed to inspection and removal of diseased trees from orchards in July. During the latter month orchard inspection was completed for the season in Colorado, Illinois, Maryland, New Mexico, North Carolina, Pennsylvania, and Utah. Inspection is being continued in the other phony peach infected States and in California. In the last-named State, inspectors are finding a large number of newly infected mosaic trees in orchards where diseased trees have not been previously removed; whereas, in areas where diseased trees have been removed on discovery, recurring infections are relatively slight. One mosaic-infected tree was found in Hopkins County, Tex., and was immediately removed. Inspection of previously infected and adjacent properties in Illinois, Maryland, and Pennsylvania revealed but two phony-infected trees on a previously infected property in Marion County, Ill. No infection was discovered in Illinois in 1937 or 1938.

Citrus canker eradication.--No citrus canker infections were discovered in July. Inspection work has been concentrated during the month in Harris County, from Houston to the county's east boundary. On 427 properties were found 40,566 citrus trees, of which 39,308 were destroyed. Along Clear Lake, which is bounded by ranches, one of which is known as the West ranch, consisting of several thousand acres, now a game preserve, have been found several old house sites surrounded by Citrus trifoliata. The greater part of this ranch has been strip-worked. Regular inspectors will shortly be assigned to inspect properties in Houston, where little previous work has been done.

Eastern drought restricts movement of quarantined products.--Transit inspectors report shipments of materials restricted by Federal domestic quarantines have been unusually light through most inspection points during July. Apparently dry weather in the East is restricting the usual movement of produce and plant material from that area.

Transit inspectors foster volunteer aid.--The importance of the good will of the Post Office Department personnel and the carriers is exemplified by the recent finding and reporting at Pittsburgh by alert Railway Mail Service clerks of 2 adult Japanese beetles in through-mail sacks. One live

beetle was found in a sack from the Pennsylvania Terminal at New York and 1 crushed beetle from a sack loaded at Philadelphia. Reporting of air mail shipments at Chicago, Kansas City, and St. Louis resulted in inspection of 40 shipments of plant material.

INSECTICIDE INVESTIGATIONS

Removal of phenothiazine spray residues from apples.--C. W. Murray, of this Division, and A. L. Ryall, of the Bureau of Plant Industry, both stationed at Yakima, Wash., have recently reported (Indus. Engin. Chem., News Ed., v. 17, No. 12, p. 407, June 20, 1939) that phenothiazine spray residues on apples in amounts up to 0.06 grain per pound may be readily reduced to 0.01 grain per pound or less with present washing equipment and solutions. Although phenothiazine spray residues on apples or other fruits or vegetables is not regarded as deleterious to health, such residues may be unsightly and it may be desirable to remove them. An account of these tests is given.

Comparison of rotenone methods.--S. I. Gertler is carrying on collaborative work on several species of rotenone-bearing plants. The purpose is to compare results obtained in the analysis of samples by the crystallization method with alcohol purification as published by Cahn and Boam (Jour. Soc. Chem. Indus. 54(8):37T-42T, Feb. 22, 1935), with the Jones titration method as published in Industrial and Engineering Chemistry (Analyt. Ed., v. 10, No. 1, p. 684, Dec. 15, 1938). In each case room temperature extraction with chloroform is used in conjunction with decolorizing carbon.

Chemical study of commercial geraniol.--Variations in attractiveness for the Japanese beetle of commercial grades of geraniol have led to a renewed study of these baits. The grade of geraniol used contains only about 50 percent of the alcohol, geraniol, the remainder consisting largely of citronellol, other alcohols, and esters. Chemical and physical fractionations of samples of the commercial material are being undertaken by H. L. Haller and H. A. Jones in an effort to determine the constituents most attractive to the beetle. Certain fractions already prepared have been tested this past season at Moorestown, N. J., by the Division of Fruit Insect Investigations. R. D. Chisholm, in charge of the chemical investigations relating to Japanese beetle control at Moorestown, is studying the decomposition of these materials and means of preventing it by the use of antioxidants. It is also hoped that this work will lead to the setting up of better specifications for baits attractive to the beetle.

Increasing solubility of rotenone in petroleum oils.--A serious drawback to the use of rotenone in sprays where a hydrocarbon oil is used as a solvent is the low solubility of this compound in the oil. A method for increasing the solubility of rotenone from 0.01 g. to 0.25 g. in 100 cc. of a hydrocarbon such as "Deobase" has been developed by H. L. Haller and L. E. Smith. This process should result in the use of higher concentrations of rotenone in commercial fly sprays. A public service patent application, which covers the process employed, is pending.

Anur cork tree--a new insecticide.--Recently a preliminary examination disclosed that the fruit of the anur cork tree (Phellodendron spp.), a tree that possesses interest in connection with soil-erosion problems, possessed

insecticidal properties. Extractives of the fruit were found to be highly toxic to mosquito larvae, codling moth larvae, and the house fly. A chemical examination of the extractives has now been undertaken.

New apparatus for particle-size measurements.--The many entomologists who are taking an ever-increasing interest in the relation between particle fineness and insecticidal efficacy, in powders for dusting and spraying, will welcome the appearance of a new apparatus designed by E. L. Gooden, physicist in the Division of Insecticide Investigations. This device indicates directly the average particle diameter of a powder, without the necessity for a size-distribution analysis, any sedimentation experiments, or any microscopic measurements. No calculations are required, provided the approximate density of the material is known in advance. Problems of solubility do not enter, as they do in sedimentation, and the sample is not consumed or altered in the experiment, but may be used later for other work. The principle on which the instrument works is that a current of air flows more readily through a bed of coarse powder than through an otherwise equal bed of fine powder. Final tests on the accuracy of the results given by the apparatus are almost completed.

Toxicity of chlorophenols.--In a continuation of studies of the toxicity of phenols to goldfish, the three isomeric monochlorophenols were prepared and tested by W. A. Gersdorff and L. E. Smith with respect to concentration and survival time, and the results were compared with each other and with those for phenol. The introduction of chlorine into the phenol molecule results in a markedly different mode of toxic action from that of phenol. According to the minimal product of the concentration and survival time which is a measure of toxicity in its range of most powerful action the relative toxicity of the three isomeric chlorophenols as compared with phenol (1) is as follows: ortho-, 1.15; meta-, 1.51; para-, 1.89. Details of this work are the subject matter of a manuscript which has been submitted for publication.

BEE CULTURE

Colony collects 40 pounds of pollen in 1 year.--There have been many estimates as to the amount of pollen carried in by a colony in 1 year. Frank E. Todd, of the Pacific States Bee Culture Laboratory, by means of pollen traps at the entrance of a hive has made actual determinations of the amounts carried in by a colony during 2-week periods throughout the entire year. He has presented the following data for the 12-month period beginning June 16, 1938.

Period		: Total	:	Period	: Total
		: pollen	:		
1938		: Grams	:	1939	
June	16-30-----	: 316	:	January	1-15-----: 0
July	1-15-----	: 570	:		16-31-----: (Trace)
	16-31-----	: 1,293	:	February	1-15-----: 13
August	1-15-----	: 845	:		16-28-----: 735
	16-31-----	: 832	:	March	1-15-----: 1,603
September	1-15-----	: 804	:		16-31-----: 2,889
	16-30-----	: 523	:	April	1-15-----: 2,957
October	1-15-----	: 345	:		16-30-----: 2,168
	16-31-----	: 218	:	May	1-15-----: 984
November	1-15-----	: 65	:		16-31-----: 582
	16-30-----	: 0	:	June	1-15-----: 165
December	1-15-----	: 0	:		
	16-31-----	: 0	:	:Total for 12 months--17,907 (39.47 lbs.)	

A correlation of the brood-rearing cycle of the colony with its daily pollen income was evident. Furthermore, the data support the general observation that most of the pollen comes in during the morning.

Alfalfa in Imperial Valley supplies pollen freely.--In previous work alfalfa was not observed to supply pollen to the honeybee in abundance. Studies in the last few months by Geo. H. Vansell, of the Pacific States Bee Culture Laboratory, indicate that this is not the case in all localities. In a recent report on these studies he states: "The pollen situation in alfalfa in the Imperial Valley was radically different from that observed by me anywhere else in California, Oregon, Nevada, or Idaho, where alfalfa seemed to be a meager pollen source. This plant was providing pollen for the bees at times rather freely in Imperial Valley. Very clearly, wind was a serious handicap in working alfalfa for pollen and nectar. During the height of the first duststorm, bees were not present on any plant and it was during this time that many of the colony observations were taken. Bees worked alfalfa for pollen especially in the morning, but a few bees collected pollen throughout the day. The method of collecting pollen from alfalfa is not clear to me, because numerous bees were working untripped blossoms apparently for pollen. It seems impossible that they could obtain pollen without tripping. In the case of such bees the shorter mouth parts and the whole posterior ventral part of the head, and the anterior ventral part of the thorax were completely covered with a mass of pollen. This, in connection with the appearance of the bees when working the blossoms, indicated that they were reaching in with the mouth parts exclusive of the tongue, taking out the pollen after which it was transferred in the usual way. The bees worked alfalfa for nectar in the characteristic fashion. In some instances they would scramble over the top of the blossom reaching in with the tongue, in other cases they would work from the side in some manner thrusting in the tongue. Alfalfa was providing a tremendous amount of nectar during our visit. Bees were working it daily except during the high periods of wind. Many of the hives were full, needing more room for ripening; however, ripening in the Imperial Valley may not be a very serious undertaking, considering the high temperatures and low humidity."

Scale insect on white fir produces honeydew copiously.--Mr. Vansell also reports: "A large scale insect, resembling a lecanium, on white fir (Abies concolor) is producing a copious supply of water-white honeydew at the 5,300 feet elevation in Eldorado County, Calif. The insect has been tentatively identified by G. F. Ferris, of Stanford University, as belonging to the genus Physokermes. Prior to this observation the source of the fir honey was thought to come from aphid insects."

IDENTIFICATION AND CLASSIFICATION OF INSECTS

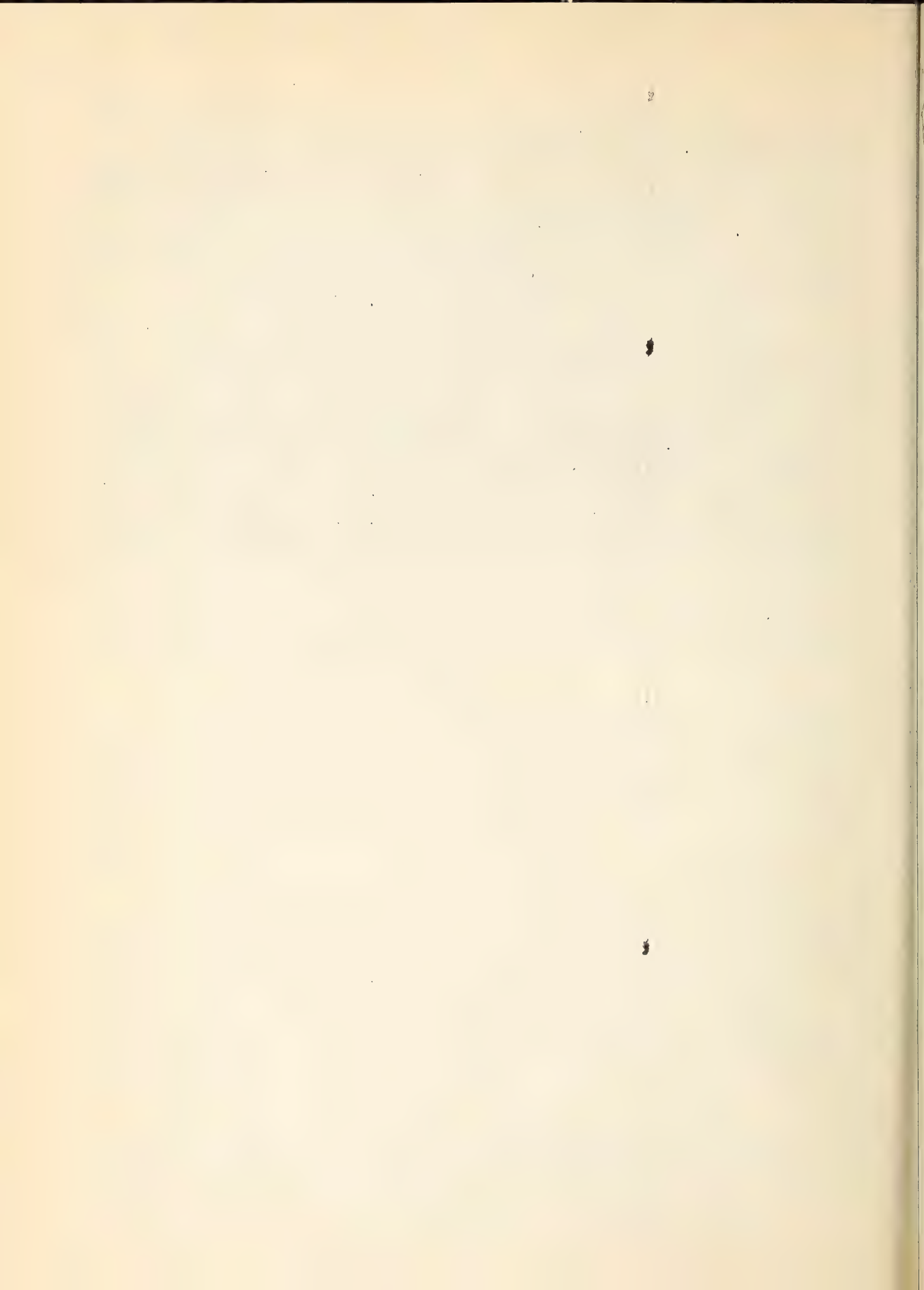
A new American record for European bruchid.--The European broom bruchid (Bruchidius villosus (F.)), established in Massachusetts for some 20 years, was received for identification in June emerging from the seeds of common broom (Cytisus scoparius) taken at Monticello, the estate of Thomas Jefferson, near Charlottesville, Va. It is uncertain whether this is an extension of the former colony or represents a separate introduction into Virginia. The common broom and its allies have been much planted as ornamentals in this country and the broom has become established in several Atlantic States in limited colonies, but on the Pacific coast, from Vancouver Island to San Francisco, it is rapidly expanding its range and occupying large areas of the coast, which resembles its European home in climate. Bruchidius villosus, however, is not known to be established anywhere on this continent except in Massachusetts and Virginia. This insect has no great economic significance, as it affects only close allies of the broom, species of Cytisus, Laburnum, Spartium, Calycotome, and Genista, and does not reinfest seeds in storage.

A valuable addition to the collection of Diptera.--From H. Schmitz, S. J., of Ignatius College, Valkenburg, Holland, C. T. Greene has received for the National Collection 67 named species of Phoridae and Termitoxeniidae, 54 of which are new to the collection. The family Termitoxeniidae has hitherto been unrepresented in the National Collection. It is of special interest because its species are guests in nests of termites in Java, are wingless, and quite unlike other flies in appearance. Three of the species received (representing 3 genera) are of this family.

Two tropical species of leafhoppers found in the United States.--Recent collecting in Florida by P. W. Oman has brought to light interesting records of the occurrence of two tropical leafhoppers in the United States. Agallia albidula Uhl., a common species in the West Indies and northern South America, and previously recorded from the United States only from Mount Desert Island, Maine, was taken at La Belle, Fla. At the same locality Typhlocybella ninina Baker was found in abundance. This species, originally described from Nicaragua, and common throughout Central America, northern South America, and the West Indies, was not previously known to occur in the United States.

Ctenothrips bridwelli Franklin recorded as a lily pest.--Ctenothrips bridwelli was described by Franklin (Ent. News 18: 247-250, figs.) from specimens collected near Dover, N. H., on Symplocarpus foetidus (skunk cabbage), on April 11, 1904. Since that time this thrips has been found in various localities in the eastern United States, chiefly on the above plant

and on Trillium. On July 22, some specimens of Thysanoptera were received for determination from E. P. Imle, of the Boyce Thompson Institute for Plant Research. They had been collected on lily foliage and on examination were found by Floyd Andre to be adults and nymphs of Ctenothrips bridwelli Franklin. Mr. Imle wrote on August 9, forwarding a statement of his experience with this species. It was first observed by him at Charlotte, Vt., on June 7, 1939, on a border planting of about 100 plants of Lilium unbel-latum which were all infested. The stems and under portions of the leaves of the lower third of the plants showed numerous feeding marks. The lower leaves were turning yellow in many instances. Numerous nymphs were present but no adults were observed. The same garden was visited again on July 25, by which date the damage had increased to the point where most of the leaves on the lower half of the plants were dried and brown. By then most of the nymphs had transformed to adults so that the immature stages were difficult to find. Mr. Imle found the same species of thrips on several occasions this season on Lilium speciosum, L. formosanum, L. canadense, L. superbum, L. henryi, and L. regale in a garden at Bronxville, N. Y., where it was causing noticeable injury. A small infestation was also noted on L. regale and L. tigrinum on July 26 at Manchester, Vt. In addition to its potential importance as an economic pest of lilies, Ctenothrips bridwelli is considered of significance as a possible vector of the destructive virus disease of lilies.



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VOLUME VI



UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

NEWS LETTER

FOR AUGUST 1939

Vol. VI, No. 10

(Not for publication)

October 1, 1939

ADMINISTRATION

H. F. Willard

H. F. Willard, of the Division of Foreign Plant Quarantines, died in Honolulu on August 18, 1939. Mr. Willard was born in Neillsville, Wis., on February 21, 1884. Following his graduation from the Massachusetts Agricultural College in 1911, he went to Honolulu to become an instructor in Mills College, a missionary school for Polynesian and Oriental students. After serving with credit at that institution, he resigned to become a homesteader of Government land in and about Haiku, Island of Maui, and pioneered in the development of pineapple culture on Maui Island. Later he was made foreman of the pineapple cannery erected and operated at Haiku to care for the crops of the homesteaders. In 1916 he returned to Honolulu and became associated with the fruitfly work of the Bureau of Entomology. At first he gave his entire time to the fiscal and inspection phases of the work but later he entered actively into the research problems, particularly those centering on determining the effectiveness of introduced parasites of the Mediterranean fruitfly. A number of excellent papers dealing with parasitization, several in cooperation with C. E. Pemberton, were later published. On July 1, 1928, Mr. Willard was transferred to the Plant Quarantine and Control Administration and from that date until his death was engaged in the enforcement of quarantines affecting the movement of plants and plant products from Hawaii to the mainland.

EDITORIAL OFFICE

Memorandum No. 2. Tables

Tables are used when the data can be presented more concisely or more clearly in this way than in the text. In the manuscript each table should immediately follow the paragraph in which it is first referred to, unless this reference is incidental and not in the place where introduction of the table logically comes. In general, the same data should not be presented in both the text and tables, except for purposes of comparison or interpretation.

A table must have three or more columns and two or more lines. Two columns of data comprise a tabulation, which is not numbered and may or may not have a heading.

In arranging data in tables consideration should be given both to conciseness and ease of comparison. Occasionally it is necessary to repeat columns of data in several tables, but this should be avoided unless clarity requires it. Do not cover too many points in a single table, but do not make two or more tables when the data can be combined to advantage.

A table consists of (1) a heading or title, (2) box or column headings, (3) the stub, (4) the body of the table, and (5) footnotes.

The heading or title should indicate clearly, accurately, and briefly the principal items of information to be found in the table. It should be definite rather than general. All tables should be numbered and have headings.

The box or column headings should show the elements or kind of data to be found in the column below, with the units expressed below the box. (The style varies in outside publications.) In the stub column the unit is placed in the box heading. Be sure the unit is clearly associated with the box heading.

The stub is the extreme left-hand, or first, column of the table, and should contain the main items about which data are presented or the elements being compared. Sometimes a stub consists of more than one column. Lack of understanding of which elements should be placed in the column headings and which in the stub is one of the most common difficulties in table making, and leads to awkward tables that are hard to follow.

The body of the table comprises the data that are being presented.

Footnotes are used to give additional information about certain data or groups of data necessary for their interpretation, or which represent exceptions to the other data. They should not be used to explain the procedure or give details of an entire experiment; such information belongs in the text.

When the data of a table fall in distinct groups, such divisions may be indicated (a) by center heads, (b) by flush heads in the stub followed by indented items, or (c) by dividing the stub into two or more columns and tying up with braces.

Tables should be ruled to set off the column headings from the body, and also at the bottom of the table but above the footnotes; but there should be no rules between individual lines in the body of the table.

FRUIT INSECT INVESTIGATIONS

Pear psylla in Pacific Northwest.—E. J. Newcomer, of the Yakima, Wash., laboratory, reports that this insect, which hitherto has been known to occur only in the Eastern States, was recently found by Washington State workers to be present east of Spokane. It is not known how the insect found its way to the Northwest. Surveys so far reported record infestation only from a rather limited area in the vicinity of Spokane. In addition to the survey made by Mr. Newcomer, preliminary surveys have been made by a number of State workers. At a conference of State and Federal officials, held at Spokane on August 29, plans were made for a more detailed cooperative survey to determine whether the psylla has found its way to any of the main pear-producing areas of the Pacific Northwest.

Some codling moth larvae remain in hibernation throughout summer.---M. A. Yothers, of the Yakima laboratory, reports finding, in August 1939, hibernating codling moth larvae in the soil attached to or near tree trunks. These larvae have been there since the fall of 1938, and show no indication of pupating this season. Literally hundreds have been found in a neglected orchard, which had a large crop last year but has practically no crop this year. They can be readily distinguished from this year's worms, their white color contrasting strongly with the pinkish color of the new worms.

Fumigation of prop poles for killing hibernating codling moth.---Following up a complaint by a local grower that codling moth injury in past years appeared to be most severe around stacks of poles used the previous season for bracing limbs of apple trees, D. W. Hamilton, of the Poughkeepsie, N. Y., laboratory, made a study of the problem. Because of excessive labor costs, the grower deemed it inadvisable to remove these poles from the orchard and fumigation experiments were conducted on 2 stacks, each consisting of approximately 1,000 poles cut from saplings or young trees, many containing rough bark. These were stacked in "wigwag" fashion. Each pile was about 10 feet wide at the base and 20 feet high, and contained almost 1,000 cubic feet of space. To retain the fumigant, heavy tarpaulins were placed over the poles and held in place by ropes. In order to check results more readily, 5 cheesecloth bags containing codling moth pupae were tacked throughout each stack at various distances from the ground. Hydrocyanic acid gas was used as the fumigant. In 1 stack of poles this gas was generated by placing 1 pound of sodium cyanide eggs in sulfuric acid in 2 battery jars on opposite sides of the base of the stack. In the other stack 2 pounds of calcium cyanide was placed on the ground under the poles. The fumigants were placed at the base of the stacks about 4 p. m. on a still day and the tarpaulins left in place until 8 a. m. the following day. In the stack in which sodium cyanide was used as the source of the gas, the mortality was 100 percent, whereas there was 42 percent survival in the stack treated with calcium cyanide.

Food for rearing raisin moths.---No satisfactory medium for use in rearing larvae of Ephestia figulilella Greg. in the laboratory has been available. Charles K. Fisher, of the Fresno, Calif., laboratory, has made a food which promises to be an improvement over others that have been tried. Four ounces of puppy meal (labeled as a "biologically complete" food), 4 ounces of Zante raisins ("currants"), 2 fluid ounces of honey, and 2 fluid ounces of glycerine were kneaded by hand to form a granular, slowly drying mixture. Larvae of the raisin moth and of the Indian-meal moth (Plodia interpunctella (Hbn.)) grew very rapidly on this diet and the adults were of large size. A suggestion that puppy meal be tried was contributed by G. F. MacLeod, of the University of California. The honey-glycerine moistener was taken from a formula published by M. H. Haydack, of University Farm, St. Paul, Minn.

Storm destroys recently settled scale insects.---Willis Mathis, of the St. Lucie, Fla., laboratory, has recently made observations on the effect of a tropical storm on recently settled scale crawlers. Of 178 young Florida red scales (Chrysomphalus aonidum (L.)) that settled on August 3, all but 15 were destroyed by a tropical disturbance which occurred on August 11, with wind-gust velocities of 60 miles per hour and a precipitation of 2 inches of rain in 24 hours. These insects had been marked and were under observation in connection with biological studies.

MEXICAN FRUITFLY CONTROL

Fruitfly populations in August.---Trap recoveries indicated there was a reduction in August of 86 percent in the population of Anastrepha ludens Loew in the lower Rio Grande Valley of Texas. Of the 166 adults taken, 93 came from 1 property that had been unusually heavily infested earlier in the season. Throughout the latter half of the month only 11 flies were trapped in the entire area. Fruitfly larvae were found on 3 premises in August. Only 6 fruits on these 3 plantings were found to contain larvae and in 2 of them the larvae were dead. The population of Anastrepha serpentina Wied. increased to its highest recorded level in the area during August. Since no known hosts are in the area, their occurrence is of more entomological interest than of economic importance.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Threshing of alfalfa destroys adults of *Hypera brunneipennis*.---As a result of the recent discovery by Arizona State officials of the presence of a new weevil pest of legumes, *Hypera brunneipennis* (Boh.), in the Yuma Valley, Ariz., it became immediately desirable to determine what effect the threshing of alfalfa for seed would have upon the survival of adult weevils contained in the hay. As a result of a series of 12 threshing tests made by W. C. McDuffie at Yuma, it was shown that in no case did any live beetles succeed in passing through the threshing machine. Numerous fragments of weevils, placed alive in the hay before threshing, were found both in the dirt-seed and blower outlets of the thresher. It was therefore believed that there was very slight danger, if any, of seed becoming contaminated with live beetles. This is an important question because the Yuma Valley is an important alfalfa-seed producing and shipping area.

JAPANESE BEETLE CONTROL

New Dutch elm disease infections located by scouts.---With the discovery of elms infected with the Dutch elm disease in the towns of Beekman, Northeast, and Unionvale, in Dutchess County, N. Y., infections have been found in each of the 20 towns in the county. A diseased tree was found in the town of Kent, Putnam County, the only town in the county that had not heretofore disclosed infection. Also, in August a first-record infection was reported from the towns of Ancram and Livingston, in Columbia County, N. Y. The tree in the town of Ancram was found in a swamp near Ancramdale. This town abuts on the State line where the Connecticut-Massachusetts line joins the eastern border of New York. The Ancramdale tree is only a few miles from Massachusetts. Selective-scouting and intensive sanitation work is being concentrated in the Ancramdale swamp. The 2 Columbia County trees are the northernmost infections found this year. Confirmation of the presence of the disease in 3 elms in the town of Windsor, just east of the city of Binghamton, Broome County, N. Y., disclosed a new isolated infected area. In Connecticut there was a considerable projection of the infected zone following the location of diseased trees in the towns of Litchfield and Woodbury, Litchfield County. In New Haven County, Conn., first-record infections were reported from the towns of Milford, North Haven, Seymour, Southbury and West Haven. The Woodbury infection, in Litchfield County, is located approximately 12 miles from the nearest previously known confirmation in the town of Newtown, Fairfield County. The tree in the town of Litchfield is isolated from other known infections. Pennsylvania townships in which confirmed trees were found for the first time in August were as follows: East Rockhill, Haycock, New

Britain, Plumstead, Richland, Springfield, and West Rockhill, in Bucks County; Salisbury and Upper Saucon, in Lehigh County; Smithfield and Stroud, in Monroe County; and Hanover and Lower Saucon, in Northampton County. A first record in Chesterfield Township, Burlington County, N. J., extended the infected zone in that State farther southward. Seven confirmations were determined by the crows working outside of the main infected area during the month. Two of these were found in the Athens, Ohio, area; 3 in Marion County and 1 in Hamilton County, Ind.; and 1 in the Cumberland, Md., area.

Reduced infection in New Jersey.---Results of the Dutch elm disease scouting during the 1939 foliar season show a 32-percent reduction in the number of confirmations in New Jersey, as compared with the confirmations during the same period in 1938. The grand total of confirmations is still much greater than in 1937. Seasonal confirmations for the last three summers were as follows:

County	Confirmations as of--		
	Sept. 3, 1937	Sept. 3, 1938	Sept. 2, 1939
	Number	Number	Number
Bergen-----	482	1,177	1,119
Burlington-----	-	-	1
Essex-----	347	1,454	705
Hudson-----	4	7	1
Hunterdon-----	191	1,862	1,103
Mercer-----	1	685	412
Middlesex-----	103	484	264
Monmouth-----	6	23	42
Morris-----	920	1,342	1,327
Passaic-----	336	526	254
Somerset-----	1,048	2,726	1,523
Sussex-----	16	153	416
Union-----	382	1,227	441
Warren-----	62	296	509
Total-----	3,898	11,962	8,117

Cloudburst scatters logs at burning site.---A sudden rise in a river from a depth of 4 inches to 4 feet nearly narooned a fire tender and washed away a pile of logs being burned near Woodbury, Conn. A Dutch elm disease confirmed tree had been piled on the riverbank and ignited. About 7 p. m. the fire tender watching this and other fires noticed that, although there had been little rain in Woodbury, the river was rising rapidly. By the time the employee could gather up his tools and start for higher ground the water had increased to the height of his waist and he was obliged to wade waist-deep across the flats. From Tuesday morning until Thursday afternoon was occupied in scouting to pick up the wood that was scattered along the riverbank for a distance of about 16 miles. It was necessary to hire a boat and haul some of the logs out of Lake Goar. To make sure that all of the infected tree was recovered, the tree was reconstructed at the burning site.

Per diem scouting force terminated.---Beginning on August 23, the scouting force organized on June 12 and paid from regular Departmental funds was disbanded

The per diem scouts in Connecticut were terminated on August 23, those in New York on August 26, and the Pennsylvania men on August 29. Approximately 1,500 scouts were involved.

Benefit of elm-sanitation work apparent.---Effectiveness of the sanitation program, as carried on in Pennsylvania last winter was evidenced by the absence of confirmed trees within the mile radius of confirmed trees sanitized during the winter season.

Aerial hitchhikers intercepted.---Two inspectors stationed at the Newark, N. J., Central Airport intercepted 264 Japanese beetles that had either flown into the cabins or baggage compartments of outbound transport planes or were being taken into the planes on passengers' clothing or baggage. The heaviest flight occurred on August 2. On that day the inspectors intercepted over 50 beetles that would otherwise have traveled to distant points in the course of the following 24 hours. Numerous interceptions were made each day until August 20, after which the collections dropped to about 3 beetles per day. Most of the interceptions late in the month were from passengers' clothing and golf bags. Tests to determine adult beetle survival at high altitudes were continued, this time with beetles flown from Pittsburgh to Newark, inasmuch as the eastbound flights are at a higher altitude than westbound flights. Beetles were carried on two flights, with a maximum altitude of 9,000 feet. Seven beetles out of a total of 69 beetles transported were dead at the end of the two-hour flight, hardly indicative of any great mortality that could be attributed to the insect's inability to survive at high altitudes. Another inspector was stationed at the Camden, N. J., Airport until August 22 to check the loading and unloading of planes at that point. Beetle flight at Camden was not severe enough to infest planes landing there, nor were any beetles found on passengers' baggage or clothing.

Virginia nursery shipments started.---Several nurserymen on the Eastern Shore of Virginia have started their fall digging and shipping. The services of 1 inspector are required daily at a large peony farm where digging has been started in preparation for shipment of thousands of peony roots, all of which have to be washed free of soil. This establishment recently completed a methyl bromide fumigation chamber to test the adaptability of the fumigant for all types of peony roots. This chamber will not be used for commercial fumigation this year, but will be thoroughly tested and if practical will be used on a commercial scale next year. Inspectors in this district report that a much greater proportion of the trucks moving south via the Cape Charles ferry are properly certified than in previous years. This is attributed to the inspectors stationed at the ferry to warn truckers of the necessity for certification and the closer guarding of the exit highways just south of Norfolk. Inspectors at road stations and mobile inspectors in cars returned 19 trucks to Norfolk for inspection and certification. Twenty-four beetles were removed from products inspected at Norfolk.

Japanese beetles found in Canada and Bermuda.---A report received from the Canadian Plant Pest authorities states that one live Japanese beetle was brought to a Canadian inspector by a gardener who found it feeding on a rose at Yarmouth, Nova Scotia. One live beetle was found in a trap at Lacolle, Quebec, a port of entry for trucks transporting farm products. Another was found in a carload of apples arriving at Toronto from the State of Delaware. Live beetles were also

found in a truckload of mixed fruits and vegetables destined to Quebec from New York City. A report dated July 26 from the Bermuda Department of Agriculture states that interceptions of two live Japanese beetles in ship's hold, one in passenger's baggage, and one on Front Street, Hamilton, were made. No beetles had been caught in traps set in the vicinity of the piers where ships from New York dock.

Quarantine activities in Metropolitan Area.---A considerable acreage planted to lima beans in the Riverhead section of eastern Long Island necessitated extensive scouting of beanfields to determine the presence of Japanese beetles. This field scouting was performed in lieu of inspection of large quantities of lima beans. Three banana companies shipping bananas from New York City fumigated 1,427 empty refrigerator cars during the month, prior to loading the bananas under protected conditions. A new door screening arrangement was utilized, while 8 cars were loaded during a moderate beetle flight. Prefumigation of refrigerator cars was discontinued on August 30, since the companies had enough cars ahead to last during the remainder of the season.

New Jersey certifications.---Over 300 truckloads of fruits and vegetables were certified for movement from New Jersey to North Carolina, South Carolina, Georgia, Virginia, and Florida. In South Jersey growers and truckers were unwilling to provide facilities for inspection and certification of the products at the farm or packing shed, preferring to stop at the inspection center at Fredericksburg, Va., for inspection and certification. One South Jersey nurseryman reported that he had trapped approximately 400 quarts of beetles during the summer. An inspector in Monmouth County obtained permission from a number of property owners for treatment of their premises with nematodes and with the milky white disease for control of Japanese beetle grubs.

Maryland nursery infestations.---During the summer three of the largest nurseries in the Maryland regulated area were found slightly infested. Maps of the exact locations where the Japanese beetles were found were prepared preliminary to consideration of a subdivision and reclassification of the nursery units involved. Scout crews also operated outside the regulated areas in Harford, Baltimore, Carroll, and Frederick Counties. Beetles were found in many districts, including a number of heavily infested farms. Considerable checking of stock was necessitated in connection with the removal of the U. S. D. A. Experimental Greenhouses from 12th Street and Constitution Avenue, Washington, D. C., to Beltsville, Md.

Beetle flights on the Delaware River.---On August 16 the stewards on ships arriving at Chester, Pa., stated that when they passed Lewes, Del., beetles flew on the decks in swarms. An eastern wind from the Delaware shore prevailed that day. All banana boats arriving at Piers 5 and 9, North Philadelphia, report that their decks are hosed down after passing through the beetle flight area miles down the Delaware River. Inspections of produce for ships' supplies were curtailed in the Philadelphia area, owing to the rapid departure of all foreign vessels affected by the European war.

Heavy Japanese beetle infestation in Pennsylvania field corn.---An unusually heavy infestation of the Japanese beetle in field corn in the Horsham, Montgomery County, Pa., area was reported in August. As many as 200 beetles were taken from

the silks and tassels of a single corn plant. A farmer at Kinzer, Pa., gathered over 2 bushels of beetles from his corn, then quit in disgust. On a farm near Kirkwood, Pa., 74 beetles were removed from one corn leaf. Starlings were reported as feeding heavily on the beetles in these farm areas.

New England beetle infestations.--The first indication of the presence of the Japanese beetle in White River Junction, Vt., was observed by the district inspector there on August 5. Both sides of one of the avenues were found heavily infested for a distance of about 300 yards. Heavy feeding was observed on grapes, woodbine, and roses. Another infestation numbering several thousand beetles was reported from Brattleboro, Vt. Owners of the invaded properties in Brattleboro are interested in control measures and are planning a trapping campaign next season.

Gypsy moth infestations.--Reports from district inspectors in Massachusetts indicate that new gypsy moth egg clusters are numerous in the Quincy district and that nursery infestations have decreased in the Middleboro and Haverhill districts, as compared with last year. From observations in the Cape Cod section of Massachusetts, the district inspector believes that gypsy moth infestation will be heavier there next season. The egg-laying season was about concluded in the Framingham, Mass., district at the end of the month and the number of egg clusters in the vicinity indicates an increased infestation over this summer's comparatively light infestation. Oviposition was still under way at the end of the month in the Bangor, Maine, district. Defoliation of from 75 to 100 percent was reported from points in the southern and western portions of the Concord, N. H., district.

Heavily infested lumber inspected.--Eighteen egg clusters, 21 larvae, and 84 pupae of the gypsy moth were removed from 5 carloads of lumber inspected in the Rochester, N. H., district. From a single carload inspected at Madison, N. H., there were removed 10 egg clusters, 16 caterpillars, and 74 pupae. The lumber in this load was piled along a woods road in solid hardwood growth in a section heavily infested with the gypsy moth. Prior to the inspection many caterpillars and pupae had been destroyed in the process of grading. It is unusual to find lumber piled in a location that has not been at least partially cleared, as clearing allows the lumber to dry thoroughly and lessens the fire hazard. Among the products offered for inspection and certification during the month were 20 lots containing infestation. From these 38 egg clusters, 22 larvae and 117 pupae were removed and destroyed.

Dry season affects New England nursery shipments.--Inspection and certification of nursery stock from New England nurseries was at a low point in August. This was partly due to the long-continued dry season which prevailed in New England, resulting in the killing of nursery stock both on private property and at some of the nurseries. A number of nurserymen used their spraying equipment for several weeks to water growing stock in the field.

FOREST INSECT INVESTIGATIONS

Elm bark beetle attacks healthier appearing trees.--C. W. Collins, of the Morristown, N. J., laboratory, reports that an unusual condition has been noted this year in connection with attack by the smaller European elm bark beetle

(Scolytus multistriatus Marsh.) on elm in New Jersey. Adults have penetrated the bark and made egg galleries in trees which are in a healthier condition than those normally attacked, judging from outward appearances. It is probable that such injury is at least partly due to the severe drought that occurred this year in New Jersey and elsewhere in the northeastern section of the United States. The dry weather presumably affected some trees so that the beetles formed egg galleries in material that would not have been suitable for such attack had the rainfall been greater.

Ambrosia beetle transmits Dutch elm disease fungus.—W. D. Buchanan, of the Morristown laboratory, states that the Dutch elm disease fungus (Ceratostomella ulmi) has been recovered from adults of the introduced ambrosia beetle (Xylosandrus germanus Blandf.) after they had bored into and later left elm logs infected with the fungus. Ceratostomella ulmi was also cultured from chips from elm logs, originally free of the fungus, into which X. germanus adults had bored after they had contacted logs infected with the fungus. These experiments were carried on under controlled conditions. While the Dutch elm disease fungus has been isolated from adults of the ambrosia beetle on several occasions, Mr. Buchanan's latest experiments give additional information concerning this insect as a carrier of the organism.

Lyctus adults develop in less than 4 months indoors.—Adults of Lyctus planicollis Lec. emerged from seasoned hickory less than 4 months after the hickory was exposed to beetle attacks, according to a report by B. H. Wilford, of the Asheville, N. C., laboratory. On March 18 over 200 Lyctus adults were liberated in a can containing shed-seasoned hickory. All of these adults subsequently died and were removed from the container about 1 month after infestation. For the full period the can was kept in a greenhouse, artificially heated until the end of April. Temperature during that time was kept at approximately 80° F. during the day and 50° at night. On July 10 the first emerging adults were observed. On July 12, 52 emergence holes were counted.

Eastern spruce bark beetle survey in Northeast—T. J. Parr, of the New Haven, Conn., laboratory, reports as follows on the eastern spruce bark beetle situation in New England: "In a survey of mature and overmature spruce stands in blow-down and other areas in the White and Green Mountain National Forests in New Hampshire and Vermont, conducted during the first 2 weeks of August, it was found that the eastern spruce bark beetle (Dendroctonus piceaperda Hopk.) is still on the decline. In some areas in the White Mountains where there were light infestations last year, no insects were found this season. In "The Bowl," a primitive area near Wonalancet, N. H., which apparently was rather heavily infested last year, fewer wind-thrown trees were infested this season than was the case in standing timber in 1938. A permanent sample strip 180 chains long and 3 chains wide in the Green Mountain National Forest had many trees infested in 1937, 8 infested trees in 1938, and but 2 trees infested this year, both of which were wind-thrown. No control measures have been recommended for the White Mountain or Green Mountain National Forest areas this year.

Results of reconnaissance surveys of Black Hills beetle.—The fight against the Black Hills beetle was carried on during July and August in the form of a reconnaissance, or "red top" survey, on six national forests, according to Dwight A. Hester, of the Fort Collins, Colo., laboratory. In general, the forests examined appeared to be much freer of trees killed by Black Hills beetle than they

were last year. It now appears advisable to make a special attempt to clean up areas in which the infestations have been greatly reduced by past control and to treat other small infestations which may be a nucleus of more serious infestations in the future. The Black Hills National Forest is thought to be in the most critical condition. This infestation, although not exceedingly heavy at this time, appears to be very aggressive and is spread over about 100,000 acres of ponderosa pine timber. Extensive surveys to determine the number of infested trees and the size of the areas needing treatment have been recommended for the Black Hills, Medicine Bow, Roosevelt, Pike, Harney, Gunnison, and Cochetopa National Forests. The areas involved will total some 571,340 acres.

Wood borers in rustic log church.—Following the burning of their church in 1934, the trustees of the First Congregational Church of Brewster, Wash., decided that a rustic log building would be an appropriate replacement. In 1935 a rather large rustic log church was constructed of western larch and lodgepole pine. In 1938, the congregation was considerably upset when "sawdust" began to appear on the floor, and in 1939 was even more alarmed when larger quantities of dust, larvae, and adult insects, were found. A larva sent to the duPont Company and then to the Washington, D. C., office of this Bureau was determined as the cerambycid beetle Haplidus testaceus Lec. A recent examination of the building, by J. M. Whiteside, of the Portland, Oreg., laboratory, revealed that most of the trouble was in the lodgepole pine rafters, the material for which had evidently been cut from dead trees in a pole stand. Nearly every rafter had been attacked by the beetle and the bark was very loose and housed a large quantity of boring dust which sifted from the emergence holes when the rafters were even lightly tapped. The larvae had mined the outer layers of sapwood and had penetrated the heartwood to a depth of about 1 inch, but had not materially weakened the rafters. Recommendations were made which would stop the activity of the beetles in the rafters. This situation will be followed with interest for several years, because the trustees are desirous of preserving the rustic appearance of the building and are reluctant to remove the bark from the other parts of the church.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Increase in gypsy moth defoliation in New England.—Records of areas defoliated by the gypsy moth in New England are now being checked and tabulated, but complete figures are not yet available. The grand total of acreage defoliated in New England will exceed last year's total by about 150,000 acres. This increase was caused by a considerable increase of defoliation in Maine and a very great increase in New Hampshire and Vermont. There was apparently some decrease in Massachusetts, a marked decrease in Rhode Island, and some increase in defoliation in Connecticut.

Drought has mixed effect on gypsy moth work.—Heavy showers during the first few days in August ended a period of protracted drought, extinguished several sizable forest fires that were burning in the Northeastern States, and permitted the burning of brush and debris that had accumulated from gypsy moth ground work and thinning operations. This was the first time burning had been possible since early in the spring, in most localities. Thunderstorms, most of which occurred late in the day or at night during the next few days, kept the forests in condition for safe burning but did not interfere materially with the scouting work.

However, the rain that fell during this period was not sufficient to replace the moisture lost during the long dry spell, and hot weather during the latter part of August caused a return of drought. The situation became so serious that most of the small mountain streams and many springs in some localities where gypsy moth work was in progress dried up so completely that good drinking water was almost unobtainable. The prolonged absence of rain permitted the examination of tree growth in extensive swampy areas in Massachusetts and Connecticut, as these areas became completely dried out. It is usually necessary to scout the swamps during the winter, after they are well frozen over.

Gypsy moth scouting work not yet in full swing.--The wide range in development of the various stages of the gypsy moth that may be found at this season is illustrated by the fact that new egg clusters were located during the second week in August in the same woodland area where caterpillars were still extant. When this overlapping of the stages became evident, scouting in that locality was temporarily discontinued. At the end of August gypsy moth scouting work was being done in remote sections of Vermont which are practically inaccessible during the winter, when many of the roads become impassable. While scouting work in Massachusetts is not yet in full swing, some newly deposited egg clusters were found in several of the areas examined east of the barrier zone. Very little scouting has been done in Connecticut since the close of the spraying season, the greater part of the work in that State consisting of patrolling burlap bands at infested sites; however, scouting work will soon be pushed in all States where Federal gypsy moth work is conducted.

Benefits of burlapping work greatly reduced this year.--The full benefit that could be obtained from the burlap bands that were attached to the trees during the latter part of May and in June to trap gypsy moth caterpillars will not be realized this season because of the delay in starting the gypsy moth project. Many of the larvae had reached the pupal and adult stages by the time W. P. A. gypsy moth work could be resumed late in July. No evidence of the gypsy moth was found at the site where an old egg cluster was located during the last scouting season in Johnson Township, Lamoille County, Vt., although many trees were banded and the area was carefully checked.

Assembling cages recover male gypsy moths.--Numerous adult male gypsy moths have been taken from tanglefoot surrounding assembling cages put out in selected towns in Vermont, New York, and Pennsylvania this season. It is evident, from the location of cages where moths were taken in Vermont, that there has recently been considerable windspread of young caterpillars from the heavily infested sections near the Connecticut River into the barrier zone area just north of Rutland, in both Addison and Rutland Counties. In New York State moths have been captured at cages in the town of Esopus, in Ulster County, which borders the Hudson River on the west; at Shawangunk, on the southern edge of Ulster County; at Ramapo, which borders the New Jersey State line in the extreme southwestern portion of Rockland County; and one moth was found at a cage in Woodbury Township, Orange County, located west of the Hudson River and the barrier zone. Moths were also taken at cages placed in eight towns situated within the quarantined area in Lackawanna, Luzerne, Monroe, and Carbon Counties in Pennsylvania.

Pupal collections for assembling cage work greatly reduced.--The annual collection of female gypsy moth pupae was delayed considerably by the discontinuance of W. P. A. work from July 1 to July 20. The moths issuing from these pupae

are used in the preparation of the attractant which attracts male moths to assembling cages. The total number of female pupae that it was possible to collect was only slightly more than 80,000. Nearly 36,000 female moths emerged from these pupae and were used in the preparation of slightly less than 1,200 charges of attractant. These were placed in storage for use in assembling cage work next year. The comparatively small number of charges obtained will restrict the caging program for 1940 to a much smaller amount than has been done during the last few years.

Fences surrounding areas sprayed for gypsy moth are patrolled frequently. Fences erected around areas sprayed with lead arsenate in June so that livestock could not consume the poisoned foliage, were patrolled at frequent intervals during August to make certain that they remained intact.

Logged-over areas in Green Mountains present scouting difficulties.—Most of the timber has been logged off of many large sections in the Green Mountains of Vermont, leaving extensive areas covered with slash and blown-down trees. Dense thickets of sapling hardwoods and conifers have grown up which are extremely difficult to scout for the gypsy moth, especially when they are located on precipitous slopes. Several gypsy moth scouting crews working in Vermont have encountered these arduous conditions since the resumption of field work this fiscal year.

Gypsy moth quarantine inspector discovers infestation in woodland.—A gypsy moth quarantine inspector who was walking through the woods in order to examine mine props in Spring Brook Township, Lackawanna County, Pa., discovered a gypsy moth infestation in the forest. A preliminary survey indicated the presence of 46 egg clusters. Spring Brook is located near the center of the area quarantined on account of the gypsy moth.

C. C. C. gypsy moth work.—A total of 4,321 6-hour man-days was used in August on gypsy moth work east of the barrier zone under the supervision of this Bureau. The work consisted of a small amount of scouting, some thinning work, and patrolling burlap bands. The burlapping work was finished for this season at the end of August, and much less was accomplished than during the previous year. Burlap was applied to 191,495 trees on 486 acres, and the men patrolling the bands crushed slightly more than 980,000 caterpillars and pupae this season. During the previous season 613,014 trees were banded on 2,153 acres, which resulted in the destruction of more than 7,600,000 gypsy moth caterpillars and pupae. The reduction in the numbers of caterpillars and pupae destroyed was partly due to a diminished infestation in the areas treated and partly to a large decrease in the number of men available for the work. Burlap placed on trees during the previous year was patrolled and turned this year. Most of the burlap was in satisfactory condition, but a small amount had to be replaced and new twine was applied in many cases. So far this fiscal year the C. C. C. crews have worked on 1,369 acres, 331 of which have received thinning operations, and 18,920 gypsy moth egg clusters have been destroyed.

PLANT DISEASE CONTROL

Spread of white pine blister rust.---During the last 2 months several newly infected counties have been reported in the North Central and Southern Appalachian regions. In the North Central region blister rust on white pine was found for the first time in Luce County, Mich. The oldest canker found appeared to be of 1934 origin. Rust was reported for the first time from Oscoda County, Mich., the disease being found on Ribes cynosbati. In Minnesota infection was found on both pine and Ribes in Fillmore County. About a dozen trees were infected, half of which had already been killed. The infection dated back to about 1931. Approximately 40 percent of the infection on Ribes was in the telia stage with 3 percent of the leaf surface and 1 percent of the bushes infected. In Medina County, Ohio, infection was reported on Ribes for the first time. Throughout the region, rust has been found abundant on Ribes, and new locations of rust on pine within the known range of present infection are numerous. In the Southern Appalachian region the rust was found for the first time in Calvert County, Md., on wild Ribes, and in Pocahontas County, W. Va., on white pine. The infection in Pocahontas County was mostly on 1935 wood and several young trees, from 1 to 2 feet in height, were dead or dying. Approximately 20 trees were examined.

Girl scouts continue Ribes eradication in Virginia.---Girl scouts from Camp May Flather in the George Washington National Forest, who performed some Ribes-eradication work earlier in the season, continued to take an active interest in this work. A total of 92 girls worked on Ribes eradication at various times in July and August. Crews were organized with a foreman and from 4 to 7 girls. They put in 276 hours of labor and destroyed 840 wild gooseberry bushes. This is the third season in which the girls have cooperated in control work. An illustrated article entitled, "Girl Scouts Go Forth to Serve in Conservation Work," was published in The American Girl for July 1939. This article, which describes the work of the girls in helping to protect the white pines against blister rust, was written by Mrs. Ruth Taylor Myers, Nature Counselor at Camp May Flather.

Forest fires handicap blister rust control operations in West.---During the latter half of July serious forest fires broke out in California and the extremely favorable fire weather caused by the excessive heat and low humidity made their control very difficult. On the Shasta, Lassen, Plumas, and Sierra National forests and in the vicinity of Yosemite and Sequoia National Parks, fires raged for 10 days. All available blister rust workers were on fire duty during this period. Ribes eradication, especially in the National Parks, was seriously handicapped by these forest fires and dangerous fire weather, the worst experienced in California in the last 30 years. Fire conditions were materially reduced during the latter part of August because of sporadic showers and a general rise in humidity over the entire timber belt. It is hoped that control work during the month of September can be carried on without frequent interruptions for fire-suppression duty. H. E. Swanson, in charge of blister rust control work in the Northwestern States, reports that the fire situation became serious in that region in the latter part of August, with the entire Kaniksu blister rust force of both the Forest Service and the Bureau of Entomology and Plant Quarantine being called out on a 7,000-acre fire. Fortunately, this fire as yet has done no appreciable damage, while on the other hand it has accomplished some good by reburning parts of a 1926 burn in Kalispell Creek which was scheduled to be snagged and burned

sometime in the future. The fire was stopped on all fronts before it penetrated green timber.

New areas of *Berberis canadensis* found in Indiana.—During the last 3 months more than 67,000 *Berberis canadensis* bushes have been located and destroyed in Pulaski and White Counties, Ind. Stanley Castell, in charge of barberry eradication in this State, points out that the 7 new areas of infestation have all been located on the banks of tributaries to the Tippecanoe River. The infestations were found during the regular course of the intensive survey being conducted with security wage earners in these counties. Salt brine was used for treating the bushes.

Destruction of barberry bushes in Ohio since January 1.—Harry Atwood, State leader in charge of barberry eradication in Ohio, reports that since January 1 an intensive survey has been made of about 4,000 square miles of area in Auglaize, Clinton, Darke, Fayette, Madison, Ross, Highland, Brown, Pickaway, and Fairfield Counties, and that a total of 4,333 barberry bushes have been destroyed. A preliminary survey was made in these counties during the period 1921-24, and many of the planted bushes removed. As a result of the intensive work conducted this year, 109 new properties have been found to be infested with barberry bushes. Only 7 percent of the old properties on record were found to have bushes when inspected during the course of the intensive survey.

Losses from stem rust estimated as negligible in 1939.—Preliminary estimates of losses from stem rust in 1939 indicate that the loss to wheat did not exceed a trace, or trace plus, in any of the States participating in the barberry eradication program, with the exception of Virginia and West Virginia, where barberry bushes are still numerous enough to be responsible for local spreads of the disease. The loss to barley exceeded a trace only in North Dakota, where there was a considerable number of late, heavily rusted fields, and where the average loss may have been as much as 1 percent. More than a trace of loss to oats has occurred only in Wisconsin, Indiana, and Virginia. The loss to rye was a trace or zero. In the physiologic-race survey a total of 393 isolations from 326 collections made in the United States and Mexico have been identified to August 28. Thus far race 56 has not been found in rust material identified from southern Mexico. From 33 collections 44 isolations were made, with races 38 and 59 the most prevalent, as in past years. From 25 collections made in northern Mexico there were 37 isolations, including races 17, 38, 56, 49, 11, 19, and 139. A total of 312 isolations have been made from material collected in the United States, including 267 uredial isolations and 45 from aecial material. In addition, about 300 cultures are now in process of isolation and identification. The results thus far available indicate the continued prevalence of race 56 in the United States, with race 38 second in prevalence. These two races comprise 82 percent of the total uredial isolations thus far made. Nine different races have been isolated from uredial material, while 11 different races have been identified in aecial collections. In the case of aecial material, race 56 is followed in prevalence by race 17. Of 142 aecial collections successfully cultured, 162 varietal isolations have been made; in other words, two varieties of *Puccinia graminis* have been identified in each of 20 collections. These included 75 isolations of *P. graminis tritici*, 51 of *P. graminis secalis*, and 30 of *P. graminis avenae*. Observations made during the first week of August for fall infection of

stem rust indicated that Hordeum jubatum was commonly infected with stem rust in the uredial stage between St. Paul, Minn., and about Moberly, Mo. South of this point no Hordeum was found along the route through Missouri, north-central Arkansas, Oklahoma, and thence to San Antonio, Tex. Some fields had been plowed in Oklahoma and a considerable number in northern Texas, so that volunteer growth could be expected following adequate rainfall. With the appearance of volunteer grasses or grains in the South, and the late rusting of Hordeum in the Northern and Central States, all that would be required for rust infection farther south is north-to-south wind movement.

COTTON INSECT INVESTIGATIONS

Relation of environment to hibernating pink bollworm larvae.---With assistance from the Division of Pink Bollworm and Thurberia Weevil Control, L. C. Fife conducted experiments during July and August 1939 at Brownsville, Tex., to obtain information on the formation of long-cycle or hibernating larvae in relation to the field clean-up. Green and open cotton bolls were collected on July 25 and left in different environments in the field until sufficient time had elapsed to be certain that the remaining larvae had entered the diapause. The bolls were then examined between August 22 and 31. No long-cycle pink bollworms were found in 2,300 green bolls removed from the plants, 800 of which were placed on the surface of the soil and 1,500 buried 3 to 4 inches below the surface. In 100 green bolls on stalks cut and scattered over the surface of the soil no long-cycle larvae were found, but some larvae were found in 200 green bolls on stalks that had been cut and piled the same day. No long-cycle larvae were found in 800 open bolls placed on the surface of the soil exposed to the sun, but larvae were found in open bolls placed on the soil surface in the shade of rank-growing cotton plants, open bolls buried 3 to 4 inches deep, and in open bolls on stalks cut and scattered over the soil surface or placed in piles. In the 4 environments where green bolls were used, long-cycle larvae were found only in the bolls where the stalks with the green bolls were piled. In 5 environments where open bolls were used, long-cycle larvae were found in all cases except where the bolls were picked from the plants, and placed on the surface of the soil, exposed to the sun. Only enough bolls were examined to determine the presence of live larvae as the infestation was too low to make accurate counts of the numbers of larvae used or to attempt to determine the percentage of larvae entering the diapause under different conditions. The mean maximum temperature for August was 90.6° F., with precipitation on 9 days. No cages were used, but the soil beneath the experiments was examined to a depth of 3 to 4 inches between September 6 and 13, to determine whether the high temperatures or other conditions had caused the larvae to leave the bolls and enter the soil. No live larvae were found in the 45 square yards of soil examined. The experiments definitely show that long-cycle pink bollworm larvae were found in the lower Rio Grande Valley as early as the latter part of July.

Boll weevil control on Sea Island cotton.---In a boll weevil control test which C. S. Rude is conducting in a 5-acre field of Sea Island cotton at McIntosh, Fla., nine treatments or methods of control are being used. The plots are 1/20 acre in size and each treatment is replicated four times. Between August 2 and 17 three boll weevil infestation counts were made in each plot at 7-day intervals with the following results:

Treatment	Average infestation, August 2-17, 1939 Percent
Pre-square mop followed by calcium arsenate dust after 10-percent infestation	36.5
Spraying with calcium arsenate in water after 10-percent infestation	39.3
Calcium arsenate dust after 10-percent infestation	40.8
Pre-square dust with calcium arsenate followed by calcium arsenate dust after 10-percent infestation	43.4
Calcium arsenate-sulfur 50-50 after 10-percent infestation	51.0
Spraying at 7-day intervals with calcium arsenate-syrup starting with pre-square stage	73.9
Mopping at 7-day intervals with lead arsenate-syrup starting with pre-square stage	76.1
Spraying at 7-day intervals with lead arsenate-syrup starting with pre-square stage	79.4
Untreated check plots	82.9
Mopping at 7-day intervals with calcium arsenate-syrup starting with pre-square stage	84.0

It will be noted that so far as boll weevil control is concerned there is little difference in the first four treatments.

Low cotton flea hopper infestations do not justify control measures.---K. P. Ewing and Charles R. Parencia report concerning a series of cotton flea hopper control experiments completed in Calhoun County, Tex., by August 23, 1939. The cotton flea hopper infestations in this area were lower than any previous year since investigations have been conducted in the vicinity of Port Lavaca, Tex. The infestation was about normal early in the season but increased very slowly and did not reach the point where control measures are usually recommended (25 per 100 terminal buds) until during the latter part of May. Experiments with insecticides were started at that time, as planned, but the infestation did not increase as it usually does. The peak was reached during the week ended June 10, with an average of only 62 flea hoppers per 100 terminal buds in the untreated plots, or about half of the usual numbers for this section. Beginning with the week ended April 29 and including the week ended July 8, 1939, the average number of flea hoppers for 100 terminal buds was as follows: 7, 16, 18, 32, 37, 37, 62, 48, 47, 30, and 9. The insecticides tested were: (1) 1 part of calcium arsenate

to 2 parts of ground sulfur dust, (2) 1 part of calcium arsenate to 2 parts of micronized sulfur dust, (3) ground sulfur, (4) micronized sulfur, and (5) wettable micronized sulfur as a spray. All experiments received at least 3 effective applications. Tests were conducted, comparing each material applied in the early morning and at midday. The infestation was so low that in most of the tests there were no significant gains or differences in yields. The results from these tests emphasize the fact that light infestations of cotton flea hopper do not cause any significant reduction in yield.

Pink bollworm infests okra in Cameron County, Tex.--L. C. Fife reports that from August 14 to 19, 1939, with assistance from the Division of Pink Bollworm and *Thurberia* Weevil Control, okra pods from 16 farms near Brownsville, Tex. were examined for pink bollworm. The size of the okra fields ranged from about 1/2 acre to 33 acres, totaling 73 acres. The pink bollworm (*Pectinophora gossypiella* (Saund.)) was found in 2 fields and *Crocidosema plebeiana* Zell. was found in 9 fields. In the 1,769 okra pods examined, 2 pink bollworms and 19 *C. plebeiana* were found. Additional examinations of 1,339 pods were made from September 11 to 16, and 16 larvae were found, of which 12 were identified as pink bollworms and 4 as *C. plebeiana*. In the August examinations the highest infestation was 1 percent, but 6 percent of the pods were found infested by the pink bollworm in 1 field in the September examination, not including exit holes, which could not be definitely attributed to this species. The feeding signs and exit holes of *C. plebeiana* seem to be identical with those made by the pink bollworm and the mature larvae are easily mistaken for pink bollworm. The first examinations were made from okra adjacent to cotton fields which contained a few green bolls, but most of the cotton had been destroyed when the second examinations were made. The determinations were made by C. Heinrich.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

The situation in south Texas and the lower Rio Grande Valley of Mexico.--At the close of August the south Texas pink bollworm regulated area consisted of the lower Rio Grande Valley district, comprising the counties of Cameron, Hidalgo, Willacy, and Starr, and the area referred to as the Coastal Bend, embracing the counties of Kleberg, Nueces, Brooks, and Jim Wells. These areas were brought under regulation on account of pink bollworm infestation in 1936 and 1938, respectively. Gin-trash inspection from the 1939 cotton crop revealed a heavy pink bollworm infestation along the Rio Grande in the southern part of Cameron County, and lighter infestation in all other counties under regulation. During August incipient infestation was also found in the counties of Duval, Jim Hogg, La Salle, Maverick, Webb, and Zapata, lying just outside of the regulated area. The harvesting of the cotton crop was well advanced in the lower valley district by the first of August, and clean-up of cotton fields began in that area during the second week of that month. For the purpose of handling the clean-up program, the south Texas regulated area has been divided into 3 zones, in accordance with the degree of infestation. (1) The heavily infested area, which includes a strip of land approximately 5 miles wide extending from the Hidalgo-Cameron County line west to the salt flats on the east, comprising approximately 12,000 acres. (2) The generally and substantially infested area, comprising the remainder of Cameron County from the north line of the extremely heavily infested area to the Willacy County line, with the exception of a small area in Cameron County north of the "North Floodway," and, in addition, the south.

eastern corner of Hidalgo County. This area comprises approximately 45,000 acres of cotton. (3) The lightly infested area, comprising that portion of Hidalgo County not included in zone 2, that part of Cameron County not included in zones 1 and 2, and all of Willacy, Starr, Kenedy, Kleberg, Brooks, Jim Wells, and Nueces Counties. Individual bales of cotton from zone 1 contained a very high pink bollworm infestation, usually in excess of 100 worms, and in 1 case more than 1,000 specimens were taken from trash from a bale originating in 1 of the most heavily infested fields. As a rule, single samples of trash from zone 2 yielded from 25 to 100 pink bollworms. In zone 3, the infestation was very light, only a few worms being found in each county, and in Starr County only 1 specimen was found. The sum of \$460,000 was made available to carry out Federal participation in pink bollworm control in south Texas. The deadline set by this Division for all living stalks to be removed from fields in the lower valley counties, which constitute the early maturing section, is September 15, and in the counties comprising the Coastal Bend stalks must be destroyed by October 1 in order for farmers to receive financial aid from the Federal Government for this work. Intense clean-up measures are being carried out in the heavily infested strip in Cameron County along the Rio Grande. Stalks are cut, raked into windrows, and piled so as to be burned effectively. In a few of the most heavily infested fields stalks are cut with machetes to prevent shattering of bolls, and the debris and any shattered bolls and locks are hand-picked from the ground and placed on the piles, after which all is burned. Our objective is to rake and pile the stalks within a few hours after cutting, and this is usually accomplished. Somewhat less drastic measures are required for the generally and substantially infested area and the lightly infested area, where the clean-up requirements procedure is the same. In these zones control measures consist of cutting the cotton stalks (unless they are small enough to plow under) and plowing the roots out, so as to prevent future growth on which the pink bollworm might propagate. Stalks in all zones growing on ridges, turn-rows, or other inaccessible places, are grubbed out. At the close of August very satisfactory progress had been made in all areas. Only a few hundred acres of stalks remained to be cut from approximately 12,000 acres in the heavily infested zone, and indications were favorable for completion of the work in the lower valley counties, except where unusual circumstances may exist, by September 15. Good cooperation is being given in all areas. Cooperative stalk-destruction work in the lower Rio Grande Valley of Mexico was begun on August 10, 11 inspectors from this Division, and a number of cars, being assigned to the Mexico area to assist in the clean-up campaign. Measures employed by the Mexican Department of Agriculture for the destruction of stalks in the lower valley region are practically the same as on the American side of the Rio Grande. The heaviest pink bollworm infestation in Mexico was found in the Matamoros area along the Rio Grande opposite the heavy infestation in Cameron County, and a light infestation was found in the Reynosa section. Excellent progress had been made in the clean-up work in the Mexico area at the close of August, and farmers are giving whole-hearted cooperation.

Pink bollworm quarantine extended to include okra.---Following the finding of a light pink bollworm infestation in two okra fields in the Brownsville area of the lower Rio Grande Valley district in August, a quarantine proclamation was issued by the State Department of Agriculture on August 28, placing certain restrictions on the movement and production of okra.

Thurberia-plant eradication.---During the last week in July a recheck of the Tortillita Mountains for Thurberia plants was begun. This area was previous

worked in 1935 and 1936, when *Thurberia* plant eradication was first begun in southern Arizona, and it was thought expedient to go over this area again at this time for the purpose of determining whether or not seeds had since sprouted or mature plants had been overlooked. An average of 100 W. P. A. workers were maintained throughout August. This territory is extremely rough and difficult to cover; notwithstanding, 10,360 acres were covered in August and 271 *Thurberia* plants destroyed, most of which were seedlings.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Metaldehyde effective as snail and slug poison.---Rodney Cecil, of the Ventura, Calif., laboratory, reports that an experiment with metaldehyde against snails and slugs disclosed that this material is very effective against these pests under the conditions existing in the Ventura area. The material, consisting of a proprietary mixture composed of 2 percent of metaldehyde and 98 percent of inert material, was spread in a 2-inch strip on a sidewalk 25 feet in length, flanked by 2 strips of lawn each 25 feet square. During the period April 18 to 28, inclusive, 775 snails and slugs were attracted and killed by this poisoned bait.

Tobacco moth larvae survive winter in pack houses of North Carolina.---J. P. Vinzant and W. D. Reed, of the Richmond, Va., laboratory, report that larvae of the tobacco moth survived the winter of 1938-39 in scrap tobacco and in crevices of the walls and timbers of growers' pack houses in North Carolina. Tests to determine the possibility of winter survival of eggs and pupae under natural out-of-door conditions gave negative results. Prolonged exposure to cold killed 100 percent of the eggs, however, and such moths as emerged from pupae exposed to winter temperatures were malformed and weak. Limited surveys of widely separated areas in North Carolina and Virginia disclosed that the tobacco moth overwintered and emerged on most of the farms observed as being infested in 1938. It was found also that very few of the tobacco growers had thoroughly cleaned their pack houses of tobacco, and early in June larvae of the first generation of *Ephestia elutella* Hbn. were found in scrap tobacco on several farms. Spring emergence of adults of *E. elutella* began in the pack houses during the week ended April 21 and the peak of abundance occurred during the period May 19 to 26. It now seems probable that the tobacco moth will be found this season on many of the farms known to be infested in 1938.

Insecticide treatments against bean leaf beetle not practical.---L. W. Brannon, of the Norfolk, Va., laboratory, reports that preliminary results of an experiment conducted on the spring crop of snap beans to determine the relative effectiveness of various insecticides for the control of the bean leaf beetle indicate that the treatments, although they proved highly toxic to the insect, were of no practical value, as the plants outgrew the severe foliage injury present during the early stages of plant growth. Results of field examinations to determine the percentage of dead adults of *Cerotoma trifurcata* (Forst.) on 3 feet of bean row on each of the plots 24 hours after the first application of the insecticide demonstrated that a spray containing cube root, pyrethrum, and sulfonated castor oil and a dust mixture composed of cube containing 0.5 percent of rotenone plus pyrethrum flowers, with sulfur as a diluent, were highly toxic to the insect. The results of these experiments indicated also that sulfur was much more effective than talc as a diluent for cube root powder in the control of the bean leaf beetle.

Longevity of winter survival of sweetpotato weevil adults.---As the result of extensive observations by K. L. Cockerham and O. T. Dean, of the Sunset, La., laboratory, it was found that adults of Cylas formicarius (F.) lived for a maximum period of 144 days during the winter of 1938-39 when confined in cages without food. Moreover, it was revealed that during the spring period existing from April to June 1939 the adults lived for periods ranging from 35 to 50 days in cages without food. In the series of experiments it was shown that the mortality of adults at Houma, La., 140 miles south of Sunset, was no greater than those confined in cages at the latter point. The survival of weevils was not prolonged when the cages were protected from direct precipitation, as compared to cages where precipitation was allowed to enter; neither was it prolonged in cages on clean soil in fields nor in cages filled with dry grass. The females lived for longer periods than did the males without food. It appears that the optimum environment for longevity without food consists of a natural growth of grass and weeds which occurs typically on headlands or along fences in the weevil-infested territory. Records made on 25,000 to 30,000 sweetpotato weevil adults, carried over during the winter of 1938-39 in cages and in the insectary, indicated that the degree of natural mortality when sweetpotatoes were supplied as food reaches at least 75 percent.

Efficiency of rotenone-dust mixture against turnip aphid not improved by conditioning agents.---An extensive series of field tests performed by P. K. Harrison, of the Baton Rouge, La., laboratory, demonstrated that the efficiency of the standard rotenone-dust mixture against Rhopalosiphum pseudobrassicae (Davis) was not improved by the addition of various conditioning agents. These experiments were performed on broadleaved mustard and white-tipped radishes. The experimental series involving mustard received 3 applications of the various insecticidal mixtures at 2-week intervals beginning on March 8, whereas in the radish experiments 2 applications were made on March 24 and April 7, respectively. A total of 20 different dust mixtures were used in each experiment, involving the use of dilutions of 1.0 and 0.5 percent of rotenone, respectively. Equal parts of tobacco dust and dusting sulfur, or talc, were used as diluents. Various conditioning agents were used in 16 of these dust mixtures, such conditioning agents consisting of 1 or 2 percent of peanut oil, 4 percent of soybean flour, and 1 percent of the following: peanut butter, cottonseed oil, pine oil, oleic acid, sulfonated castor oil, sodium oleyl sulfate, or an alkylated naphthalenesulfonate. Critical analysis of the resulting data, with respect to yield of the mustard and radishes, demonstrated that there were no significant differences in yield between these treatments, indicating that the present standard recommendation for turnip aphid control, consisting of a rotenone-dust mixture containing 1 percent of rotenone with equal parts of tobacco dust and sulfur is not appreciably improved by the addition of any of the more common conditioning agents used commonly in combating aphids.

Tolerance of tuberose to hot-water treatments.---As a result of tests with hot water for the control of the bulb mite on tuberose, C. A. Weigel and G. V. Johnson, of the Beltsville, Md., laboratory, report that, on the basis of bulb production, yields on treatments with hot water at temperatures of 124° and 126° F. for 30 minutes during 1938 showed an increase over the planting weight. Some of this stock also was treated at temperatures of 126°, 128°, and 130° during the 1937 season. The 1937 and 1938 untreated bulbs, however, produced the greater percentage of size No. 1 flowering bulbs and the greater weight increase.

Data on biology of potato psyllid.---R. L. Wallis, of the Scottsbluff, Nebr., laboratory, reports that thorough examinations of the red cedars in the canyons south of Scottsbluff during mid-April failed to disclose the presence of Paratrioza cockerelli (Sulc.). It was apparent that the psyllids had left their overwintering headquarters, as they were first found in the cedars in this locality. Since the principal wild host plants, groundcherry and buffalo bur, were not up at this time of the year, it is conjectural where the psyllids spend the intervening period between their movement from the overwintering host plants and their early season breeding on the wild host plants. During the period ended June 30 a continuation of field work in the North Platte Valley near Scottsbluff and Torrington, Wyo., demonstrated that groundcherry is more important as a wild host plant of the psyllid than is buffalo bur; that the early planted potatoes carry higher psyllid infestations than do the wild host plants or tomatoes or late-planted potatoes; and that potatoes planted during the latter part of June were infested by the psyllid to only a slight degree.

Flight of wireworm adults.---E. W. Jones, H. P. Lanchester, and K. E. Gibson, of the Walla Walla, Wash., laboratory, report that the females of the Pacific coast wireworm (Limonius canus Lec.) and of the sugar beet wireworm (L. californicus (Mann.)) were not observed to take flight in the Walla Walla district this season until after most of their eggs had been deposited. These observers found that the female of L. canus will deposit approximately 90 percent of her eggs in the soil immediately after mating and when taken in flight after this period her ovaries are nearly all if not entirely spent. Collections of L. californicus adults under traps placed on the soil surface demonstrated that in this part of the wireworm territory at least this species lays most of its eggs before any flight occurs. In the Parma, Idaho, district, however, F. H. Shirck found that the L. californicus females make migratory flights of considerable extent with about one-third of their egg quota retained in the ovaries.

Entomogenous fungi kill wireworms.---F. H. Shirck, of the Parma, Idaho, laboratory, reports that two types of entomogenous fungi supplied to him through the cooperation of L. P. Rockwood, of the Forest Grove, Oreg., laboratory of the Division of Cereal and Forage Insects, have given promising results against the sugar beet wireworm. One type of fungus, Metarrhizium anisopliae (Metsch), was obtained from a fungus-killed wireworm originally sent to Mr. Rockwood from Parma. Experimental work showed that the wireworms exposed to this fungus showed a slight increase in percentage of mortality over the check insects. The second type of fungus, however, designated as Metarrhizium n. sp. (?) (Drab) and originally cultured by Mr. Rockwood from a diseased wireworm found near Forest Grove, gave a 35-percent kill, as compared to the check insects. So far as is known, the latter type of fungus does not occur naturally in Idaho. It seems significant, therefore, that this latter type of fungus apparently possesses greater virulence for wireworms native to Idaho than does the native fungus.

INSECTS AFFECTING MAN AND ANIMALS

Changes in field laboratories.---A reduction in funds for the fiscal year 1940 has necessitated a discontinuance of the Division's field laboratories at Ames, Iowa, and Valdosta, Ga. The work on cattle grubs, which has been carried out at the former laboratory, is being transferred to the Dallas, Tex., laboratory, while the investigations on horse bots are being discontinued for the present. R. W. Wells, formerly in charge of the Ames laboratory, and H. O. Schroeder

are being transferred to Dallas to continue the work on cattle grubs. S. W. Simmons, who was associated with Messrs. Wells and Schroeder at Ames, is being assigned to new duties on the dog fly investigations with headquarters at Panama City, Fla. A. L. Brody, formerly in charge of the Valdosta, Ga., laboratory, is being transferred to Panama City, Fla., where he will be in charge of research work on the dog fly and Gulf coast tick. E. E. Rogers and E. B. Blakeslee, associated with Dr. Brody at the Valdosta laboratory, are also being transferred to Panama City. The work on screwworms in the Southeast, which was being carried on at Valdosta, will be discontinued.

Investigations of eye gnats (Hippelates spp.) discontinued.--On September 1 the investigations of eye gnats, which have been carried on by J. T. Bigham at Orlando, Fla., for the last 2 years, were discontinued. Mr. Bigham is being transferred to the Division of Domestic Plant Quarantines.

FOREIGN PLANT QUARANTINES

Miss Belmont retires.--On August 31 Miss Mariel E. Belmont was retired on account of ill health. She entered the service of the Federal Horticultural Board on April 2, 1923, by transfer from the War Department. For several years she was connected with the Import and Permit Section of the Division of Foreign Plant Quarantines. In recent years she was engaged in clerical work in connection with export certification and certain other port activities. Miss Belmont always displayed a keen interest in her work and leaves behind an enviable record of loyalty and efficiency.

Mangoes washed ashore near San Diego, Calif.--During the early part of July reports came in of fresh mangoes washing up on the beach north of San Diego. The following 8 days were spent in recovering these fruits with help from the County Agricultural Commissioner's office. Approximately 18,000 fruits were picked up and burned, using old automobile casings for fuel. The fruit had been jettisoned off the coast by vessels that had been tied up by labor troubles in Mexican ports and were unquestionably fruits grown in Mexico. No infestation of fruit fly was found in the fruits examined.

Customs guard frustrates attempt to smuggle plant material.--On the afternoon of May 25 an American yacht arrived at Miami, Fla., from Georgetown, Cayman Islands, British West Indies. About 9 p. m. Customs Guard A. H. Malcolm caught the steward of this yacht attempting to smuggle ashore the following plant material: 272 mangoes, 11 sapodillas, 20 cocoa plums, 52 palm seeds, 5 banana plants, 7 citrus trees, 5 breadfruit, 1 pound tamarind fruit, 17 coral vine seed, 7 orchid plants, 7 crape myrtle plants, 1 water hyacinth plant, and 12 unknown plants. All of this plant material was confiscated and a fine of \$38.10 was assessed against the steward. A fine of twice that amount was assessed against the master of the vessel and the steward was ordered bound over to the Federal grand jury under a \$250 bond by the United States Commissioner. When this case came to trial on August 7 the steward pleaded guilty and was ordered to pay an additional fine of \$15.

Potato virus complex in South America.--Of 59 potato varieties collected by an English expedition to Lake Titicaca, cradle of Peruvian civilization, and

tested for virus diseases, only 11 were found to be disease free. In 6 Peruvian potato varieties, viruses or virus complexes were discovered whose reactions could not readily be interpreted in terms of the known potato viruses. Viruses apparently identical with those known in England as X,B,C,F,G, and perhaps leaf roll were found also in the 48 diseased varieties. This information is from an article by R. G. W. Dennis, of the Potato Virus Research Station, Cambridge, England, in the *Annals of Applied Biology* for February, 1939 (26:87-101). Mr. Dennis concludes by stating, "It follows that great caution should be exercised in introducing South American varieties into potato-growing districts." The fact that 6 unidentified virus diseases were found by a single expedition to 1 area in South America emphasizes the necessity for preventing entry of potatoes from that part of the world unless under rigidly controlled conditions.

Entomological interceptions of interest.--A living larva of the fruitfly Anastrepha suspensa (Loew) was intercepted at New York on May 15 in a bitter orange in baggage from Puerto Rico. A living adult of the chrysomelid Calligrapha notatipennis Stal was taken at Laredo, Tex., on February 18 on orchid foliage in baggage from Mexico. A living specimen of the pentatomid Euschistus obscurus (P. B.) arrived at Brownsville, Tex., on May 4 on a snapdragon in baggage from Mexico. Living adults of scolytid Xyleborus kraatzi Eichh. were intercepted at San Pedro, Calif., on May 3 in sugarcane in baggage from Hawaii. Six living larvae of the bean pod borer (Maruca testulalis Geyer) were collected on February 24 in pods of Dolichos lablab in the field at Asan, Guam. Two living adults of the tenebrionid Scleron ferrugineum (F.) were intercepted at Honolulu, T. H., on May 13, 1938, with debris from orchid plants in baggage from the Dutch East Indies. Living specimens of the coccid Gymnococcus agavium Dougl. were taken at San Francisco on April 31 on a plant of Agave sp. in the mail from Mexico. Living adults of the labiids Prosparratta humilis Hobard and Sparatta pulchra Borrelli were found at Philadelphia on March 28 under the loose bark of logs (Tabebuia donnell-smithi in cargo from Guatemala. Three living adults of the coccinellid Epilachna defecta Muls. arrived at Galveston, Tex., on May 15 with banana debris in cargo from Mexico. Living specimens of Mirotermes (M.) panamaensis Snyder were intercepted at New Orleans on March 1 in mahogany logs in cargo from Panama. A living adult of the garlic weevil (Brachymerus algirus F.) was taken at New York on October 20, 1938, in a garlic bulb in cargo from Italy. Three living larvae of the pink boll worm (Pectinophora gossypiella Saund.) were intercepted at Washington, D. C., on March 21 in cottonseed in the mail from Ethiopia via Italy.

Pathological interceptions of interest.--Bacterium citri (Hesse) Doidge was intercepted at Philadelphia August 7 on a lemon in ship's stores, the origin being given as Spain (?). Cercospora musae Zimm. was intercepted August 4 at Boston on banana leaves from Cuba. Chrysomya rhododendri (DC) DeBy. was intercepted July 13 and again August 1 at Washington on rhododendrons from Switzerland. With the coming of the fall-bulb-importing season, interceptions of Ditylenchus dipsaci (Kuhn) Filipjev on various bulbs from Europe were made but few data are available as yet. Tilletia horrida Tak. was intercepted at New York on June 7 in paddy rice from Dutch East Indies. Vermicularia liliacearum Westd. was prominent on leaves of a shipment of Iris germanica varieties from France inspected on August 29 at San Francisco.

DOMESTIC PLANT QUARANTINES

Grasshopper survey under way.—August work on the grasshopper control project included a survey of adult grasshoppers in the infested regions. Areas infested with the migratory species were divided into five districts, each with a center for local assembly of data and forwarding to the Minneapolis field headquarters office. Sixty-eight men participated in the work in addition to the technical adviser, five coordinators, and five clerks. Conferences are now to be held with State leaders to designate the areas of probable infestation by the migratory species in 1940. Plans for a survey of grasshopper eggs in the various infested areas are now being worked out.

Fall grasshopper baiting.—In the areas of long-winged grasshopper infestations, Federal baiting activities had been discontinued for the season by the last of August in the infested areas comprised of the contiguous parts of Texas, New Mexico, Kansas, and Oklahoma, and the baiting of egg-bed concentrations of this species in southeastern Colorado was nearing completion. Few egg beds of this species could be found in the above infested States, the population having been greatly reduced by the control activities of the last two seasons. The second generation of the lesser migratory species appeared in the Texas and Oklahoma Panhandles and contiguous area in Kansas, and baiting was resumed in the area for the protection of fall wheat. The second generation of this species was also reported in southeastern Nebraska and south-central South Dakota. Baiting in the Mississippi Valley was brought to a close about the first of September.

Roadsides baited for hopper control.—Federal roadside baiting for concentrations of the lesser migratory grasshoppers was conducted in August and continued in September in the "flight areas" of Montana and Wyoming, while in Minnesota the State Highway Department took up the work on roadsides in areas where farmers had recently baited lands for the protection of their crops. Federal crews spread bait in September on roadsides in the Oklahoma Panhandle for control of the heavy population of second-generation hoppers in the nymphal stage.

Merits of fall grasshopper baiting tested.—Experimental control in reducing potential infestations by baiting grasshoppers in the fall, before eggs are deposited, is under way at Stanford, Judith Basin County, Mont., an area of 18 sections having been selected for this experiment. Roadsides and idle land are being spread with bait by Federal workers, while the farmers spread their lands with bait delivered by the Bureau and mixed by county or State workers. Farmers are enthusiastically participating in the work. The entire area has been covered once with good results and further baiting will continue. This area, which was one of the latest to be invaded by flights of hoppers, has a population of these pests ranging from less than 1 per square yard in stubble to 50 or 60 in the green alfalfa, it is estimated, and some egg-laying has already taken place.

Mormon cricket control activities.—The fall survey of Mormon cricket infestations, both as to adult crickets and egg beds, was completed in August in the various infested States, and the State supervisors are now compiling the findings. The season's activities on the control of cricket infestations in the Rocky Mountain and Great Plains States were brought to a close by the middle of August, with the exception of a few days' work in Sheridan County, Wyo., where, according to a newspaper item, a snowfall of an inch and a half on August 9 in

the Big Horn Mountains temporarily checked migrations of the crickets. The possibility of cricket eggs remaining viable in the higher altitudes of these mountains over a period of two seasons or two years is one of the factors under consideration in the control program.

New infestations of white-fringed beetle.--Two rather extensive areas of infestation of white-fringed beetles have recently been found, one of 4,883 acres in New Orleans in the vicinity of Lake Pontchartrain chiefly on uncultivated land; and another of over 4,000 acres in the Maybank-Lux, Miss., area in Forrest and Covington Counties, along the right-of-way of the railroad leading to Hattiesburg, where beetles were located earlier in the season. Both Pantomorus leucoloma Boh. (formerly known as Naupactus leucoloma Boh.) and P. peregrinus Buch., formerly referred to as Naupactus, new species, infest this area. Of lesser extent were the infestations recently found at Opp, Covington County, Ala. on the grounds of a school and of a church. Adjoining cultivated area was apparently free of the beetle; at Blakely Island, across the river from Mobile, Ala., involving approximately 150 acres of waste land and dry docks; and the incipient infestations at Biloxi, Miss., and Crestview and De Funiak Springs, Fla. All the above areas, except the infestation in Forrest County, Miss., are in counties formerly known to be infested. A volunteer inspector was responsible for finding the beetles at De Funiak Springs, whereas a former laborer on the project reported the infestation at Opp, Ala. Regular inspectors discovered the other infestations. The Lake Pontchartrain area has been twice dusted by airplane. This is the only feasible method to employ over this uncultivated expanse, and the results have been good.

Cotton operations in white-fringed beetle area.--Methods of handling cotton in the various areas infested with the white-fringed beetle have been worked out with State officials, with the result that in such areas as Florala, Ala., ginning operations are restricted to points in the regulated area, whereas in areas where little cotton is produced such as Gulfport, Miss., the cotton is required to be fumigated before being ginned. Cottonseed may be moved to points outside the regulated areas only to designated oil mills equipped to handle seed without danger of carrying infestation.

White-fringed beetle destroys beans in Chile.--According to the Director of the Agricultural School at Angol, Chile, who recently visited the National Museum in Washington, the white-fringed beetle is of particular importance in that country as an enemy of beans. Although the beetles are at times only sufficiently abundant to attract attention, they occasionally destroy the entire crop. The method of control is to hill up the beans when damage becomes apparent, then irrigate the field. The plants then develop new roots above the old ones and appear gradually to overcome the effects of the earlier feeding by the larvae.

Peach inspections nearing completion.--General orchard inspection for the phony peach and peach mosaic diseases has been completed, or is nearing completion as outlined for the year, in Alabama, Arizona, Arkansas, Colorado, Illinois, Maryland, New Mexico, North Carolina, Tennessee, Pennsylvania, and Utah. The work will be continued in California, Georgia, Louisiana, and Mississippi, as well as in South Carolina, where, in Spartanburg County, there is a rapidly growing peach industry and the growers are concerned in the protection of their orchards.

from the phony peach disease. In several southwestern States the nursery stock in the regulated area is being reinspected. This is in accordance with the provisions of the State quarantines requiring fall inspection before defoliation takes place. Two mosaic infections were found in August, in an orchard in the Redlands district of Mesa County, Colo., the first time the disease has been found in this district since 1936.

Peach inspection force reduced.--The field force employed on the phony peach and peach mosaic disease control project has been reduced from 97 regular employees in the latter part of July to 42 the latter part of August. This reduction of more than 56 percent is partially the result of the completion of the season's work in several States. The allotment of relief funds to the projects, in the current year, for the removal of diseased trees carries a provision that no trees are to be removed from commercial orchards and nurseries with relief labor. State and grower participation, of which there has been a steady increase in recent years, will, it is hoped, contribute largely to the continuance of these programs. In the calendar year 1938, 22 southern States from the Atlantic to the Pacific, contributed to the work to the extent of \$72,778.

Sweetpotato weevil survey.--August work on the sweetpotato weevil project included a survey of over 500 properties in counties outside the regulated areas in Georgia, Mississippi, and Texas. No weevils were found in the Georgia counties of Brooks, Colquitt, Echols, and Lowndes, nor in that part of Lamar County, Miss. which was surveyed. In Texas a survey of 461 properties in 43 counties, including a commercial area in eastern Texas, resulted in finding 3 infestations. These were located in Brazos County, a noncommercial area in which the soil is generally unsuited to sweetpotato production. Within the regulated areas of Alabama, Georgia, Mississippi, and Texas, 11 infested properties were located during the month and eradication and regulatory activities were carried forward. During the month 20 Federal and 19 State men participated in the work.

Sweetpotato weevils being eradicated from two Mississippi counties.--A systematic survey, based on seeded inspections, has been completed in the quarantined areas of Jeff Davis and Lawrence Counties, Miss., with the result that no weevils could be found. This result was particularly gratifying in that infestations had previously been found on more than 100 properties in these areas, and approximately 400 growers are affected by the efforts of the last several months toward eradication. A survey for weevils is now being made of the parts of these counties outside of the quarantined areas.

Citrus-canker work.--The activities during August were concentrated principally in strip-working an area near Houston, Tex., and inspecting for citrus canker nearly 54,000 citrus trees on 2,000 properties in the area. A large number of Citrus trifoliata was found along the Houston Ship Channel and tributary bayous, where at one time it appears there was an effort to commercialize citrus growing. These trees, now found on old house sites and in pastures, were destroyed to the number of 49,000. In the city of Houston a house-to-house survey is being made of citrus trees, which are found growing on a large percentage of the properties. A record is maintained in the field headquarters office at Houston of the number and exact location of the citrus trees remaining in the noncommercial area of Texas where the more intensive work is carried on. In the 10 counties comprising this area there remained at the close of the last fiscal year, 184,995 citrus trees.

Three borer-infested shipments of corn intercepted.--Living larvae of the European corn borer, the larger corn-stalk borer, and the corn ear worm, were recently found in a carton of green corn consigned to Florida from a point on Long Island. The shipment was turned back by a transit inspector at New York City. Two shipments infested with the European corn borer and consigned to points in Maine were intercepted in Boston in August. All these shipments were also in violation of Japanese beetle quarantine regulations.

Japanese beetle quarantine violations reduced.--A noticeable betterment on the part of shippers in making their consignments in compliance with Japanese beetle quarantine regulations has been commented on in recent reports from transit inspectors at Philadelphia, Pa., Springfield, Mass., and Saint Paul, Minn. On comparing these statements with reports from all transit inspection points, it was found that the condition is general, 119 apparent violations having been intercepted in July of this year, as compared with 212 in July 1938.

Japanese beetles found in railway cars.--The inspection of cars of produce arriving at Chicago, Saint Paul, Cincinnati, Saint Louis, and Atlanta from the Japanese beetle area in July and August resulted in finding 15 live beetles in railway cars at Chicago.

CONTROL INVESTIGATIONS

Particle size of insecticide affects deposit.--In tests of the toxicity of coarse, medium, and fine fractions of paris green to Mexican bean beetle adults, E. R. McGovern and E. L. Mayer report that when equal amounts by weight of the three fractions of the insecticide were suspended in equal volumes of water and sprayed on glass slides a wide range of deposits resulted. The spray was applied with an atomizer-type spray. The spray mixture was held in a pint jar and agitated by a stirrer which rotated in a horizontal plane. The agitation was rapid enough to prevent any of the insecticide from settling on the bottom and slow enough so that no air bubbles were beaten into the spray; 1.25 grams of each of the three fractions of paris green were added to 100 cc. of water. Analysis of the deposits by C. C. Cassil, of the Division of Insecticide Investigations, revealed that the coarse fraction gave a deposit of about 70 micrograms per square centimeter, the medium 26 and the fine 14. The particles in each of these fractions were of rather uniform size so that practically all the particles in the coarse fraction were larger than any particles in the medium fraction and the same applied to the medium and fine fractions. In other words there was practically no overlapping in particle size between the fractions. Most materials used commercially as stomach insecticides in sprays are well pulverized and probably do not give such a wide variation in deposit as the three especially prepared fractions of paris green just discussed. However, with samples of experimental materials tested as insecticides there is sometimes a great difference in particle size between samples. Such differences in particle size may have influenced deposits as much or even more than was the case with these fractions of paris green, the deposit of which was five times as great with the coarse fraction as with the fine. With these facts in mind, it can readily be seen that the deposit and mortalities obtained in spray tests of this type might be dependent in a large degree on the particle size of the sample, as well as on its chemical composition.

Toxicity of Tephrosia.--In collaboration with A. F. Sievers, of the Bureau of Plant Industry, a study was made by W. N. Sullivan and J. H. Fales, of this

Division, of the toxicity of Tephrosia virginiana roots prepared by several methods. A series of acetone and chloroform extracts of this native legume were prepared and tested on houseflies by the turntable method. In the preparation of this material there was some question, however, whether extraction on a hot plate, removal of the solvent to determine the total extract, and similar procedures, whereby the extract is subjected to heat can be resorted to without reducing the toxicity of the extract as measured by tests on flies. A statistical analysis of the results of these tests shows that the differences in toxicity of these extracts are not significant as measured by the analysis of variance. It follows, therefore, that the conditions to which the extracts were subjected did not result in an appreciable destruction of the toxic substances present in the root. The results of this investigation are published in Soap (v. 15, No. 9, pp. 111, 113).

INSECTICIDE INVESTIGATIONS

Kenya pyrethrum.---E. Talbot Smith, the American Consul at Nairobi, Colony of Kenya, East Africa, in July, 1939, completed a report on the pyrethrum industry in that country which is of interest to all working with this important insecticide. Pyrethrum was first planted in Kenya in 1928 as an experiment and it was not until 1936 that the exports of pyrethrum were considered important enough to warrant a separate classification in the Colony's export statistics. Of the 1,980 tons of pyrethrum flowers, valued at \$842,400, exported from Kenya during the 12 months ended March 31, 1939, the United States took 1,648 tons. The industry has grown rapidly and it is expected that by the end of 1939 12,519 acres will be under pyrethrum in Kenya. Where the soil is well drained, pyrethrum is now grown at altitudes from 6,500 to 9,000 feet above sea level. Mr. Smith's report gives details as to seeding, spacing, fertilizing, picking, cost of production, drying, grading, baling, analysis, and marketing. The yield per acre ranges from 300 to 1,100 pounds of dried flowers per annum. These variations in yield are caused by differences in fertility of the soil, variations in rainfall, and other factors, the most important of which is the altitude at which grown. The higher the altitude the greater the yield. Insecticide manufacturers in the United States prefer Kenya pyrethrum flowers to those from Japan or Dalmatia because of their high pyrethrin content. Only pyrethrum having a pyrethrin content of 1.4 percent or over is exported from Kenya. The export of pyrethrum from Kenya is a monopoly controlled by the Kenya Farmers' Association.

Eugenol in a commercial geraniol.---A sample of commercial geraniol, which in two seasons' tests at Moorestown, N. J., has proved unusually attractive to the Japanese beetle, is being subjected to a complete analysis by H. L. Haller and H. A. Jones. In certain preliminary separations an appreciable amount of eugenol and some dehydrodieugenol, the latter as a zinc salt, have been found. Eugenol is not a normal constituent of the essential oils from which commercial geraniol is obtained. The presence of dehydrodieugenol, an oxidation product of eugenol, has not been previously reported in any essential oil.

Derris as a fumigant.---Recently in preliminary tests, L. D. Goodhue, of the Division of Insecticide Investigations and W. N. Sullivan of the Division of Control Investigations, have found that the smoke from certain burning mixtures of derris and potassium nitrate is very toxic to the housefly. Using from 4 to 8 ounces of derris per 1,000 cubic feet in a Peet-Grady chamber, kills of from

97 to 100 percent were obtained in all cases. An investigation is now under way to determine the proportions of derris or cube, nitrates, moisture, and other substances which will be necessary to give the maximum toxicity. This material will be tested for the control of greenhouse insects.

BEE CULTURE

Nitrite nitrogen test apparently not a specific test for *Bacillus larvae*.--

It was held until recently that *B. larvae*, the causative organism of American foulbrood, is the only organism that stores nitrites when cultured on special medium containing carrot extract without added nitrates. Consequently the appearance of a red color on adding sulfanilic acid and alphanaphthylamine acetate solutions as used in nitrite nitrogen tests, to a bacterial culture on this medium was taken as a specific indication of the presence of *B. larvae*. C. E. Burnside, of the Beltsville, Md., laboratory, however, recently encountered and isolated in apparently pure culture two spore-bearing organisms which appear to store nitrite on medium containing carrot extract in a manner similar to that of *B. larvae*. He states: "One of these gives a shade of red indistinguishable from the color produced by *B. larvae*, while the other one varies only slightly. Color reactions have been obtained in subcultures with both organisms, but the color is more intense in medium adjusted to about pH 7.0 than in more acid medium." Concerning a third organism that he was not successful in isolating, he states: "On four or five occasions a positive nitrite test has been obtained in cultures contaminated by a coccoid organism appearing singly in pairs or in short chains. No rods or other indication that *B. larvae* has grown in these cultures could be detected. It seems probable, therefore, that nitrite may have been stored by the coccoid organism. Although the testing solutions were poured off and the cultures washed with sterile water after about 30 minutes, the organism failed to grow in subcultures."

IDENTIFICATION AND CLASSIFICATION OF INSECTS

A weevil infesting canaigre in the Southwest.--

In September 1938, J. S. Rogers, of Hide and Leather Investigations, Bureau of Agricultural Chemistry and Engineering, submitted tubers of canaigre (*Rumex hymenosephalus*) taken in New Mexico that were infested with large curculionid larvae. The infestation was sufficiently severe to cause some concern, as the canaigre is grown commercially for use in the preparation of tannin. The weevil larva could not be identified, nothing like it being available in the National Reference Collections. An attempt was accordingly made to rear adults, under quarantine conditions, and the first specimen was finally obtained on August 3, 1939, almost a year after collection. It was identified as a species of the genus *Ophryaster*, possibly *O. tuberosus* Lec. More material will be needed to establish its specific identity positively.

Useful addition to the collection of Coleoptera.--

L. L. Buchanan has recently received from E. C. Zimmerman, entomologist at the Bishop Museum in Honolulu, for deposit in the National Collections, an exchange lot of South Pacific Rhynchophora, consisting of 59 species, of which 27 are represented by paratypes or co-types. Most of the species are new to the Museum Collection.

Two South American weevils collected in the Southern States.--

Among lots of Rhynchophora recently submitted for identification, were found specimens of 2

species of Conotrachelus, evidently of South American origin, though neither one has yet been specifically named. One of them was collected at Mobile, Ala., by H. P. Löding, and at Spalding County, Ga., by T. L. Bissell; the other was taken at Baton Rouge, La., by G. E. Cox, and sent in by W. E. Anderson, State Entomologist of Louisiana. Both agree specifically with specimens of unidentified Argentine species in the Museum Collection. The discovery of these in Southeastern States is of considerable interest in view of the establishment in that region of certain other South American weevils, as the vegetable weevil (Listroderes obliquus Klug), and the white-fringed beetle (Pantomorus leucoloma (Boh.)

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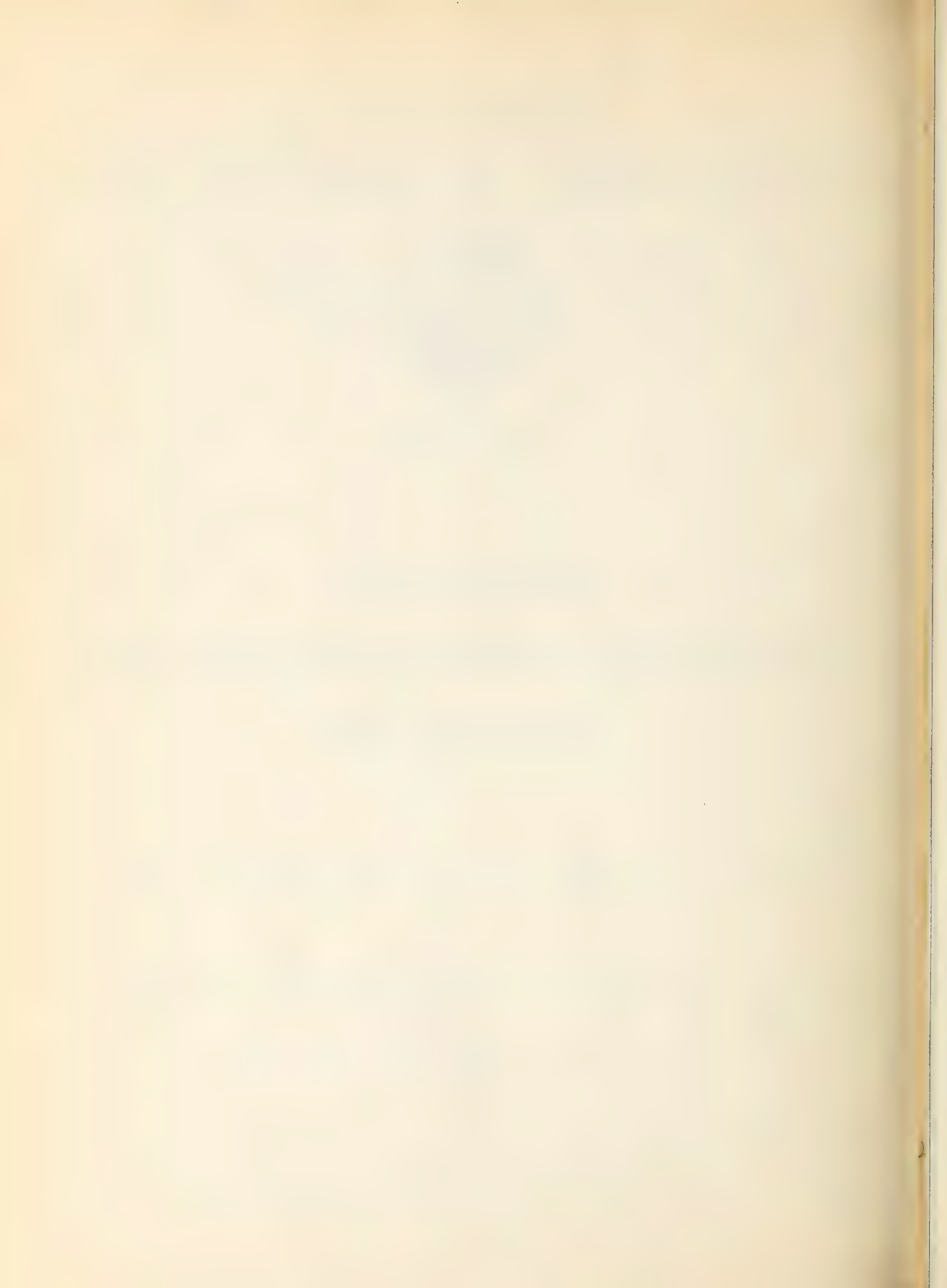
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UNITED STATES
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BUREAU OF
ENTOMOLOGY AND PLANT QUARANTINE
NEWS LETTER

VOLUME VI



UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

NEWS LETTER

FOR SEPTEMBER 1939

Vol. VI, No. 11

(Not for publication)

November 1, 1939

ADMINISTRATION

Mr. Shaw Retires

On September 30 Harry B. Shaw retired after a quarter of a century in the foreign plant-quarantine service. Mr. Shaw was born at Huddersfield, England, and had had several years' experience with importing firms, the parcel-post service, and a business of his own before going to Colorado for his health. After regaining his health he accepted a position at Bremerton, Wash., with the Navy Yard, later being transferred to Washington, D. C. While stationed in Washington he studied medicine for 2 years, then was transferred to the Department of Agriculture and assigned to work with M. B. Waite. Mr. Shaw took an examination for scientific assistant in plant bacteriology. He received his first appointment as a scientist in 1907 and was assigned to work in Utah on curly-top disease of sugar beets. He carried out a series of experiments which proved that curly-top is transmitted by the beet leafhopper.^{1/} He also made a careful study of the sugar beet nematode and its control.

In 1914 Mr. Shaw was transferred to the Federal Horticultural Board and took charge of the Board's work in New York, where he remained until 1925, when he was transferred to Washington and supervised much of the permit work for several years. With the increased importance of the export-certification work, it became necessary to have accurate and readily available knowledge of the plant-quarantine requirements of foreign countries. Mr. Shaw's knowledge of foreign languages, as well as of quarantines, quarantine procedure, and the routine of shipping from the viewpoint of commercial agents, resulted in his undertaking the task. His summaries of foreign-quarantine requirements are in constant use by other governmental agencies and by foreign organizations and exporters, as well as by this Department.

^{1/} See U. S. Dept. Agr. Bur. Plant Indus. Bul. 181. The Curly-top of Beets. By Harry B. Shaw. (July 1910.)

FRUIT INSECT INVESTIGATIONS

Spray residues on peaches not excessive.--Oliver I. Snapp, of the Fort Valley, Ga., laboratory, reports that the results of analyses made by the Division of Insecticide Investigations show that the lead and arsenic residues on ripe Elberta peaches from Georgia, that had received the regular schedule of lead arsenate during the season of 1939, proved to be a little in excess of the tolerance when not brushed (0.0365 gr. Pb per lb. and 0.0108 gr. As_2O_3 per lb.), but brushing removed half of the spray residue, as usual, and reduced it well below the tolerance (0.0194 gr. Pb per lb. and 0.0059 gr. As_2O_3 per lb.). The peaches in the experimental plats received heavier applications of spray than those made by most growers, therefore the residues on unbrushed fruit from growers' orchards this year were probably below the tolerance. Practically all packing sheds in Georgia are equipped with brushing machines, the use of which makes certain that the residues will be well below the tolerances, where the peaches have been sprayed according to the usual schedule.

Internal staining of raisin moths for dispersion experiments.--An approach has been made to the problem of marking raisin moths (*Ephestia figulilella* Greg.) by allowing them to drink colored water. This method was devised by George H. Kaloostian, of the Fresno, Calif., laboratory. Nonpoisonous liquid food color was used at the rate of 1 ounce per gallon of water. Mr. Kaloostian made a feeder which consisted of a small bread pan in which 2 sheets of white blotting paper were supported in an upright position against the long sides of the pan, the lower portion of the sheets being immersed in colored water. A wooden cover, fitting between the pieces of blotting paper, excluded moths from the water. The insects took the colored solution from the wet blotting paper. Stained moths showed color as long as 8 and 10 days after having had access to the solution for 3 and 4 minutes. The color could be seen in the alimentary tract through the translucent abdominal wall. Field work included placing 19 feeders in a raisin storage and operating malt-sirup bait traps down-wind at distances of from 100 feet to 7 $\frac{3}{4}$ mile. Four stained moths were found among 629 captured during 18 days in June. Two of them were taken at 100 feet, 1 at 1 $\frac{3}{4}$ miles, and 1 at 2 $\frac{1}{2}$ miles from the feeders.

MEXICAN FRUITFLY CONTROL

Fruitfly status in September.--In the early part of the month three adult *Anastrepha ludens* Loew were trapped in the Rio Grande Valley. No other Mexican fruitflies were taken throughout the month. The fruitfly population had remained higher in the regulated area this summer than in any other season on record, but from trap recoveries throughout late September there appeared to be no carry-over of flies from the previous season. General rains over the area naturally benefited the maturing citrus crop. Preliminary maturity tests revealed that harvesting could be started about October 1.

CEREAL AND FORAGE INSECT INVESTIGATIONS

White grub damage to lawns in Wisconsin.--T. R. Chamberlin and Lee Seaton, Madison, Wis., report that in a thorough search throughout south-central Wisconsin late in the summer, no cornfields were found to be

materially damaged by white grubs. A less-thorough search in other parts of the State also failed to reveal damaged corn. Most of the injury by grubs this year was in lawns, strawberries, and raspberries. This situation differed considerably from that observed in 1936 when, as in 1939, grubs of brood "A" were in their second year, but caused widespread damage to corn and pastures rather than to lawns. The summer of 1938 was very wet and the pastures, in which most of the grubs in corn originate, remained muddy over long periods. It seems possible that in a season so wet as 1938, well-kept lawns are more favorable for establishment and survival of grubs, than are pastures and field crops.

Sao Paulo strain of Amazon fly introduced for sugarcane borer control.--T. E. Holloway and Ralph Mathes, of the Houma, La., laboratory, report that 40 mated females of the Sao Paulo strain of the Amazon fly (Metagonistylum minense Towns.) were received on May 24 at Houma from K. A. Bartlett, in Puerto Rico, for use as breeding stock. Data on inoculations and fly emergence for the 1939 season are as follows:

Date of inoculation	Borers inoculated	Flies emerged	
	Number	Number	Percent
May 25-29-----	1,128	735	66.34
June 21-28-----	1,433	1,090	76.0
July 14-24-----	1,813	1,033	56.9
August 7-21----	2,757	$\frac{1}{318}$	$\frac{1}{11.5}$
Total-----	7,131	3,176	44.5

$\frac{1}{}$ Emergence low, owing to infestation by mites.

A total of 1,575 flies were released in 13 locations in Louisiana and 294 in 3 locations in southern Florida. In addition, 20 mated female flies were shipped to L. C. Scaramuzza for use as breeding stock at Fellsmere, Fla. This strain of fly is thought to be better adapted than is the Amazon River strain to lesser rainfall and lower temperatures, such as are found in continental United States.

Ladybeetle introduced for control of aphids.--Eighty-nine ladybeetles (Coleophora inaequalis Fab.) were received at the Houma laboratory from Mr. Bartlett, in Puerto Rico, on July 29. Breeding work was conducted to produce beetles for release for the control of Sipha flava Forbes and other aphids attacking sugarcane and other grasses. From this introduction J. W. Ingram, W. E. Haley, and L. J. Charpentier reared and released 1,064 larvae and 34 adults in sugarcane fields in 5 locations in Louisiana. Sixty adults were also shipped from Houma to Cairo, Ga., for release in sugarcane fields heavily infested by S. flava.

Sugarcane borer parasites in southern Florida.--Mr. Ingram and E. K. Bynum, of the Houna laboratory, report that in cooperation with J. W. Wilson, of the Everglades Experiment Station, they made a survey of parasitization of the sugarcane borer in southern Florida during the last of July. The average parasitization by Bassus stimaterus (Cress.) was 2.5 percent in the Lake Okeechobee area and 4 percent at Fellsmere. The percentage of parasitization by Bassus reached 11.1 in a field near Lake Okeechobee and 8 at Fellsmere. No other parasite was found in the Lake area, but an average parasitization of 10 percent of Lixophaga diatraeae (Townsend) was observed at Fellsmere. As harvesting of cane will not begin in southern Florida before November or December, these findings indicate that there may be a rather high rate of parasitization by harvest time.

Poisoned grasshoppers expelled from 10 to 86 percent of arsenic ingested.--C. C. Wilson and Alvin J. Cox, Sacramento, Calif., report that chemical analyses of grasshoppers (Melanoplus marginatus Scudd.) and their fecal and regurgitated matter showed that specimens killed within 1 hour after feeding on poisoned bait had ingested an average of 0.028 milligram of arsenic trioxide, 10 percent of which was regurgitated. Grasshoppers dying in 24, 48, and 72 hours after feeding on poisoned bait, contained an average of 0.0093, 0.011, and 0.007 milligram, with a loss of arsenic trioxide expelled or regurgitated of 19, 34, and 81 percent, respectively. Grasshoppers which had fed on poisoned bait and which were alive at the end of 144 hours contained an average of 0.001 milligram of arsenic trioxide, and had expelled 0.006 milligram of arsenic trioxide, or 86 percent, in their fecal and regurgitated matter. Unpoisoned grasshoppers that had been fed green alfalfa contained the merest trace of arsenic trioxide in the insect and in the fecal and regurgitated matter.

Multiple-generation strain of corn borer in northwestern New Jersey.--According to C. A. Clark, Moorestown, N. J., it has been stated that only the single-generation strain of the corn borer was present in northwestern New Jersey. Examinations in the fields in Hunterdon, Warren, Sussex, and Morris Counties showed conclusively that the multiple-generation strain of the borer is present in these northwestern counties.

Second-generation infestation in field corn in New Jersey.--Mr. Clark also reports that a few very heavily infested fields of late corn were observed in central New Jersey and population counts were made, the results of which are shown in the following table.

Field No.	Township	Plants ^{1/} infested	Average borers per plant ^{2/}
		Percent	Number
1-----	Burlington	100	16.5
2-----	Burlington	100	25.0
3-----	Monroe	100	18.9
4-----	Willingboro	100	40.3

^{1/} Twenty-five plants in each quarter of field examined.

^{2/} Average of 10 infested plants dissected.

^{3/} Two other fields on same farm almost as severely infested.

Substitute products for gall-nut tannin in dual-fixed nicotine dust.--C. H. Batchelder, New Haven, Conn., reports that field-plot experiments conducted at New Haven indicate that both myrobalans tannin and powdered extract of quebracho wood are satisfactory substitutes for Chinese gallotannin when used in preparations of dual-fixed nicotine dust. The two experimental preparations were compared with dual-fixed nicotine of the gall-nut tannin type in tests with early sweet corn infested by the first generation of the European corn borer.

JAPANESE BEETLE CONTROL

Japanese beetle inspection activities.--Among plant material inspected and certified during September were 26 bamboo trees grown on Long Island, N. Y., and certified for shipment to Federal engineers in Florida to be tested for hurricane protection. Twenty thousand gerbera plants were also certified from Long Island for movement to Florida, after washing of the roots under pressure to remove all soil. In the northern section of the New York City area, 20,000 soil-free peony-root divisions were certified for shipment to North Carolina. Inspections were made in the Norfolk, Va., area of displays of peanut vines to be shipped to all parts of the United States. An enormous increase in the truck movement of potatoes from central New Jersey stepped up the inspection and certification of this commodity. Several large nurseries on the Eastern Shore of Virginia began their fall shipping season in September. One large peony shipper has required almost daily inspections since the latter part of August and numerous inspections of strawberry plants were made during the month. Finding of Japanese beetles on several large Eastern Shore nurseries will necessitate the retention of one temporary inspector in addition to the usual force carried through the fall shipping season.

Plants certified on basis of methyl bromide fumigation.--Fumigation of potted strawberry plants continued through the month in the New York City area and a shipper of azaleas started using this method for certification purposes. A few scattered treatments were made in New Jersey of azaleas, general greenhouse plants, nursery stock, perennials, and roses. One shipper in the Philadelphia area discontinued maintaining a greenhouse and a lead-arsenate-treated hoeling-in area in a certified status and is depending upon his fumigation chamber to fill all his requirements for certification. Another has relinquished certification of a greenhouse and will construct a fumigation chamber in time for use during the spring shipping season. Shipments of perennials are moving quite briskly from the Philadelphia area, owing in part to the ability of some nurseries to book outside orders of plants that previously could not be moved with the soil removed, but can now be successfully fumigated to rid them of possible infestation. A nursery in the Pittsburgh, Pa., area with an outlet in one of the large Pittsburgh department stores has made inquiries concerning the construction of a fumigation chamber. This nursery recently relinquished its classified status after finding Japanese beetles widely scattered throughout their property.

Restrictions on farm products lifted.--Seasonal restrictions on the movement of farm products were lifted at midnight on September 19. Adult beetles had rapidly disappeared since late in August and had ceased their

flight throughout the area by the middle of September. All inspectors of farm products were dismissed. A few of the temporary inspectors were retained to continue inspection of cut flowers, the restrictions on which remained in effect until October 15. Fumigation of empty refrigerator cars at Philadelphia for subsequent loading with fruits and vegetables was discontinued after September 2, with the requirement for screening of vents continuing until September 9. Carload fumigation at Philadelphia was available during the season at Piers 5 and 9, North, at scattered locations along the river front, and at the Pennsylvania Railroad produce terminal. At the Edgemoor Yards, near Wilmington, Del., fumigation of loaded refrigerator cars was discontinued on September 9, following cessation of adult flight in the vicinity of the loading points on the Del-Mar-Va Peninsula. The farm products inspection platform at Fredericksburg, Va., was dismantled on September 17 and inspections were discontinued at that point on that date.

Nurserymen complete 17 methyl bromide fumigation chambers.--There are now 17 methyl bromide fumigation chambers completed and operating in nurseries throughout the Japanese beetle regulated area. Three additional chambers are almost completed and will start operation in the near future. Twelve other establishments have indicated their intention of starting construction. A total of 30,094 plants were fumigated in September, bringing to 362,717 the total number of plants fumigated since this procedure was authorized. Contact calls have been made at interested nurseries to acquaint them with the latest developments in chamber constructions and to furnish them with available data on the requirements for fumigation. Demonstrations have been arranged for this fall and winter in Connecticut and Massachusetts. Demonstrations in Maryland and New York are scheduled for early in October.

Soil treatments at isolated infestations.--Application of lead arsenate for Japanese beetle control was in progress during September in Chicago and Evanston, Ill.; Detroit, Birmingham, and Grosse Pointe Farms, Mich.; and Wilmington, N. C. Treatments in Chicago were started on July 31 and by the end of September 56.4 acres had been treated. In Evanston 3 acres of soil were treated on September 28 and 29. Soil-poisoning operations were started in Detroit on September 25, with 7.4 acres covered by the end of September. At Grosse Pointe Farms 2.3 acres were sprayed on September 18 and 19 and at Birmingham 5.2 acres were treated between September 20 and 22. In Wilmington, N. C., treatments started on September 25, with a coverage of 11.4 acres by the end of the month. Treatments in Chicago, Detroit, and Wilmington were continued into October.

Delaware distributes beetle traps.--During the past summer the State of Delaware furnished property owners in the State with 1,000 Japanese beetle traps. Observations showed that the entire State was more heavily infested than in previous years.

District of Columbia infestation.--The latest collection of adult Japanese beetles in the District was reported on September 29. The earliest reported find was made on June 9. Infestation in the District was observed as heavier than last year, particularly in the Benning-Anacostia section. Beetles are now scattered throughout all sections of the city.

Trapping for Japanese beetle at Virginia Truck Experiment Station.--Records covering catches in 24 traps operated at the Virginia Truck Experiment Station at Norfolk show a small but steady increase in the number of beetles caught during the last 3 summers. Starting with trap collections of 44 beetles in 1937, the captures increased to 109 in 1938 and 280 in 1939.

Marked increase in beetle infestations in New England nurseries.--Japanese beetle finds in New England nurseries, particularly in Connecticut, indicated a marked increase in infestations over last year. Infestations were found on 21 classified nursery and greenhouse properties in Connecticut and on 37 sources of potting soil and manure supplying Connecticut classified establishments. In addition, infestations were found on 2 nurseries in Rhode Island, 6 in Massachusetts, and 1 in New Hampshire.

Government greenhouses moved.--Considerable certification work was performed in connection with the Bureau of Plant Industry's transfer of their experimental greenhouses from the old location on the Mall at Constitution Avenue and 14th Street, Washington, D. C., to the National Agricultural Research Center at Beltsville, Md. Portions of the stock are certified and portions uncertified. This required considerable checking to assure that the 2 types of material were properly segregated. At the Constitution Avenue location the Bureau of Plant Industry operated 19 certified units, comprising a total of 42,400 square feet of glass. In addition, there was a total of 32,800 square feet of uncertified glass.

World Fair inspection.--One of the inspectors from the New York City district office visited the World Fair grounds to contact possible shippers of quarantined plant material at the close of the Fair on October 31. Arrangements were made to take care of the Florida State exhibit, including many plants of unusual character to be returned to that State. Certification of small plants from a number of the Fair concessions greatly diminished after school started. Visiting students apparently made many of the purchases of these plants for mailing to points outside the infested area.

Some real intercepting of contraband.--Late in August transit inspectors collaborating with the Bureau in Jacksonville, Fla., reported the interception of small quantities of uncertified farm products in ships' stores aboard the S. S. Sacarappa of the South Atlantic Line and the American S. S. Shickshinny. On the same day that an inspector of this Division interviewed the Baltimore, Md., ship chandler who furnished the uncertified produce, a newspaper article reported that the cargoes of these two freighters had been seized by the British. The ships had sailed from Savannah, Ga., reportedly bound for German ports.

Spurt in corn borer certifications.--Shipments requiring European corn borer certification in the Philadelphia area showed a sizable increase. Most of this increase was in the number of cut-flower shipments. Value of the shipments doubled over those made in August. Similar inspections of cut flowers almost doubled over last season in the Baltimore, Md., district.

Lumber heavily infested with gypsy moth inspected.--Ninety-five of a total of 158 gypsy moth egg clusters found in products inspected during the month were removed from 4 carloads of lumber inspected at Conway and Center Conway, N. H., for shipment to St. John, New Brunswick, Elizabethport, N. J. (1 car each), and Rochester, N. Y. (2 cars). At Danvers, Mass., 33 egg clusters were removed from birch sticks to be used in the manufacture of novelties for shipment to points outside the regulated area. Infestations of single egg clusters each were found in 6 lots of nursery stock inspected at establishments in Massachusetts, Rhode Island, and Connecticut. At Hyannis, Mass., 2 tank cars that had been held on a spur track over the egg-laying season were inspected by the district inspector before movement to Sharon, Pa., and 10 gypsy moth pupae and 1 egg cluster were removed from the cars.

Log for scientific study refused gypsy moth certification.--During September a 4-foot log and 32 pieces of bark were presented for inspection at Petersham, Mass., prior to shipment to the Idaho State College at Moscow, for study of a fungus disease. The pieces of bark were found free from infestation, but under a loose section of the bark of the log 2 gypsy moth egg clusters were found. In order to creosote and remove these egg clusters, removal of the bark was necessary. Because shipment of the log intact was desired, certification for its movement to Idaho was refused.

Dutch elm disease scouting completed in Pennsylvania and isolated infected areas.--The scheduled scouting program in Pennsylvania was completed during the last week in September. The work in Bucks, Monroe, and Northampton Counties was mainly along rivers, streams, highways, and railroad rights-of-way. In Bucks County a special problem area developed, owing to flooding of an elm concentration by a lime-manufacturing plant. Close checking has not disclosed any concentrations of elms containing wood subject to bark-beetle attack in Lehigh County, where an infection was found in one township, but several large areas containing possible beetle material were found in Milford Township, Bucks County, near the point of infection in Lehigh County. In Allegany County, Md., and Mineral County, W. Va., systematic scouting terminated at the end of the September work period for security workers. In these sections the assigned area was scouted twice and a third check was made in the localities in which infected trees had been found. In the Indianapolis, Ind., area scouts were shifted from systematic scouting for diseased trees to surveys for elm material that may harbor the insect carriers of the fungus. In the Athens, Ohio, area, scouting by automobile and on foot was still in progress the last week in the month.

Dutch elm disease scouting continued.--W. P. A. scouts continued their activities through September, with a gradual tapering off toward the end of the month preparatory to switching over to the winter elm-sanitation program. Seasonal changes in foliage made scouting for elms showing symptoms characteristic of the disease quite difficult. Despite the advancing fall season, scouting was continued in Connecticut until the second survey of the infected zone was completed. In some sections it was necessary to sample all elms that appeared to be in an unthrifty condition. In some of the northern localities of the work area systematic scouting was discontinued by September 22 because of foliar changes that masked any disease symptoms.

Bark beetles attack green elms.--Crews engaged in elm-sanitation work in the Ancrandale Swamp in Columbia County, N. Y., report that nearly every elm in the swamp contains bark beetles in various stages of development. Active beetles were noted trying to enter elms in all stages of vitality. Some beetles were entering the trunks of green elms and then backing out. In elms more suitable for their development larvae were making galleries. The same condition was noted in another swamp in Columbia County.

Four incipient Dutch elm disease infections reported.--First-record infections reported during the month of September were limited to confirmations of one tree each in Warrington Township, in Bucks County, and Middle Smithfield Township, in Monroe County, Pa., and in the towns of Kirkwood and Sanford, Broome County, N. Y. These four districts are contiguous to townships in which confirmations had previously been found.

FOREST INSECT INVESTIGATIONS

Preliminary work on phloem necrosis disease of elm.--D. E. Parker, of the Morristown, N. J., laboratory, spent the period from August 15 to September 9 in southern and central Ohio. He visited a number of areas where a phloem necrosis has caused the death of many elms. The mode of transmission of the cause of this phloem necrosis, which is thought to be a virus, is not known but insects are suspected. Specimens of various insect species associated with elm in the areas were collected and notes made concerning them. The specimens represent numerous species of Homoptera and some species of Coleoptera, Heteroptera, and Orthoptera.

Low temperatures fatal to Scolytus multistriatus.--In April 1939 A. E. Lantz, of the Morristown, N. J., laboratory, exposed short elm sticks containing overwintering larvae of the smaller European elm bark beetle (*Scolytus multistriatus* Marsh.) to certain low temperatures. The sticks and untreated check sticks were then placed in individual containers and records kept of the number of beetles that emerged. After emergence was over the bark was removed from the sticks and the number of larval tunnels counted.

<u>Lowest subcortical temperature reached (°F.)</u>	<u>Percentage of larval tunnels giving beetles</u>
+ 25	38.4
Check	40.2
+ 10	15.3
Check	39.6
0	12.2
Check	39.2
- 10	3.9
Check	34.3
- 19	0
Check	62.5

The experiment indicates that all larvae will be killed in April at a subcortical temperature between -10° and -19° F.

Plans made for collecting spruce sawfly cocoons.--P. B. Dowden and W. F. Sellers, of the New Haven, Conn., laboratory, report that detailed observations were continued at the heavily infested spruce sawfly study plots in Marlboro, Vt., until September 22. At that time practically all healthy larvae had spun cocoons and feeding was at an end. Disease killed a tremendous number of larvae toward the end of the season, but on the outskirts of the heavily infested area large numbers of larvae completed development and spun cocoons. Several areas were located which should be suitable for large-scale collections of cocoons. This work will be done by C. C. C. boys under the direction of F. E. Miller, Jr., and the cocoons will be used by the Northeastern States for rearing the cocoon parasite Microplectron fuscipennis in 1940. Two lots of Neodiprion fulviceps (?) cocoons collected at Newcastle, Wyo., by members of the Fort Collins, Colo., laboratory, were received at New Haven on August 30 and September 13. Although most of the parasites should issue from these cocoons in the spring of 1940, about 50 adults of Spathimeigenia spinigera (?) have issued this fall. About 100 larvae of Diprion polytomum Htg. were attacked by this tachinid parasite, which was successfully reared on D. polytomum under laboratory conditions in 1937.

Beech scale increases in Northeast.--L. D. Casey, of the New Haven, Conn., laboratory, reports that examination with J. R. Hansbrough of the Division of Forest Pathology, Bureau of Plant Industry, of the beech scale-Nectria permanent sample plots in eastern and central Maine this year showed that the scale has built up considerably in most of the plots, as compared to 1938, and has also spread to a number of trees not infested previously. There are still two of the plots, one at Orland and one at China, in which no scale has yet appeared. There is no increase in the number of dead or dying beech in the plots this year. In traveling between plots no areas of dead beech were noted. In most of the plots there was an increase in the degree of Nectria infection and in the number of trees affected by it. A heavy beech scale infestation was discovered north of Medway, Maine, and extending along the eastern side of Highway No. 11 for about a mile. A few trees with heavy Nectria infection were noted. This infestation is about 25 to 30 miles north of the previously known range of the scale. The scale is apparently distributed over the whole of Westchester County, N. Y. In most places the infestation is light, although a few trees possessed a medium infestation. A few lightly infested stands in Rockland County, N. Y., were visited. Rockland County borders on the western bank of the Hudson River and is just north of the New Jersey State line. In the Bartlett, N. H., experimental forest of the Northeastern Forest Experiment Station, one tree has been found heavily infested with the beech scale. This is the first record of beech scale occurrence in the White Mountain region of New Hampshire.

Control of the mountain pine beetle in white pine.--A survey of the Coeur d'Alene National Forest conducted during August 1939 by the Coeur d'Alene laboratory revealed a severe infestation of the mountain pine beetle within the white pine stands of the Yellow Dog and Downey Creek units. In this area of some 15,960 acres there are approximately 10,000 infested trees. Funds were requested by the Forest Service for a control project. An allotment of \$42,000 was received on September 19 and 5 50-man camps had been established and fully manned by September 27. C. C. C. enrollees will be used to treat 3,000 of the infested trees with the allotted

funds being used in areas less accessible to the camp. This project will be completed early in November.

Large tree produces many mountain pine beetles.--During the last 3 years western white pine trees infested with the mountain pine beetle have been felled and examined within definite study areas on the Coeur d'Alene National Forest. Among the trees examined last season, according to W. D. Bedard, of the Coeur d'Alene, Idaho, laboratory, was one 41.3 inches in diameter, 219 feet tall, and well over 300 years old, which contained 1,010 square feet of infested bark. In this tree there were 4,688 attacks and 6,516 feet, or more than a mile, of egg gallery, which produced a total of 99,850 new adult mountain pine beetles. Considering the average of all trees examined during the season, the new adults produced in this 1 tree would be sufficient to attack successfully 51 average trees.

Black Hills beetle on increase in Utah.--Donald De Leon, of the Fort Collins, Colo., laboratory, reports an increase to epidemic proportions of the Black Hills beetle in lodgepole pine on the Wasatch National Forest, Utah. Considerable control by the burning-standing method was carried out during 1935 and 1936. No control work was done during 1937 and 1938 and already in some areas the present infestation is as heavy as one or two trees per acre. On the Powell National Forest, Utah, where partial control has been carried out for the last 3 years, there is still considerable infestation in the drainages not yet treated. In some areas the increase appears to be as high as three to one.

Experimental control measures effective against cottonwood borer.--Six different materials were tested by N. D. Wygant, Ft. Collins, during the latter part of July near Elk City, Okla., against small larvae of the cottonwood borer (Plectrodera scalator Fab.) in 2-year-old cottonwoods. These materials are listed in order of effectiveness, giving the number of larvae in each test and the percentage of mortality obtained. (1) Trichlorobenzene 25-percent emulsion, 27 larvae, 100-percent mortality. (2) Transparent penetrating creosote 25-percent emulsion, 18 larvae, 100-percent mortality. (3) Orthodichlorobenzene 16 2/3 percent and naphthalene 8 1/3-percent emulsion, 43 larvae, 95-percent mortality. (4) Orthodichlorobenzene 25-percent emulsion, 22 larvae, 91-percent mortality. (5) Ethylene dichloride 25 percent emulsion, 44 larvae, 70-percent mortality. (6) Paradichlorobenzene crystals, 27 larvae, 33-percent mortality. (7) Check, 41 larvae, 15-percent mortality. Between 1/3 and 1/2 ounce of spray was applied to the base of each tree. As yet the treatments have had no apparent toxic effect on the trees; however, they should be tested more thoroughly under a variety of conditions to be absolutely sure of their safety. Asphalts, asphalts with arsenate of lead, raw linseed oil with lead arsenate, and raw linseed oil with Bordeaux mixture painted on young cottonwoods during June had no repelling action against oviposition by the cottonwood borer.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Conditions favorable to gypsy moth work in September.--In each State where Federal gypsy moth work is conducted efforts are being made to build up to the full quota of workers which, it has been estimated, could be carried after the change in pay rates which became effective on September 1.

Additional scouting work was begun in Connecticut around infestations that had been sprayed or otherwise treated during the last fiscal year. Ground work, which includes the picking up and burning of dead wood and other trash, greatly facilitates the reexamination of these localities. Although working short-handed in some sections, scouting was well under way in Vermont by the middle of September. Working conditions steadily improved with the advent of cooler weather and the beginning of light frosts, which started the shedding of foliage and the appearance of considerable color on the upper hardwood slopes in the mountainous areas. Snow fell for several hours in northern Vermont on September 26, blanketing the lower elevations under an average depth of 2 inches. Heavy rain, which fell over the remainder of the area where gypsy moth work is performed during the first part of the last week in September, interfered with the performance of field work. However, the rain reduced the fire hazard to a negligible degree, so that it was feasible to burn accumulations of brush and other waste wood immediately after the weather cleared.

Small gypsy moth infestation found in Vermont barrier zone.--A scouting crew working in Warren Township, Washington County, Vt., located a small gypsy moth infestation about the middle of September, but no attempt was made to determine its extent. Closer work will be started later at this location, when forest conditions are more favorable for locating hidden egg clusters. Warren Township is located just within the border of the barrier zone in the north-central portion of Vermont.

Infestations in barrier zone started by wind-spread of caterpillars.--The continued discovery of widely scattered new gypsy moth egg clusters in townships bordering the barrier zone in Massachusetts, together with the scarcity of old egg clusters, demonstrates that there was considerable dispersion of gypsy moth caterpillars by the wind during the last year. Where this condition occurs, scouting work is done both inside of the barrier zone to eliminate the infestations, and outside of the barrier zone line to reduce infestations in favorable locations for wind-spread to points within the barrier zone. In Blandford, which is just outside of the barrier zone in Massachusetts, a gypsy moth egg cluster was discovered inside of a rural mail box at the roadside, while the nearest other egg cluster was found in an apple tree about 300 feet distant. Infestations located in woodland recently logged off present difficult problems, as the tangles of slash and top wood left after the lumbering operations greatly increase the work necessary to clear up the gypsy moth colonies.

Late observations of gypsy moth egg deposition.--A female gypsy moth was discovered depositing eggs on September 13 in Cummington Township, Hampshire County, Mass. A similar observation was reported from Pennsylvania at about the same time. This is unusually late, as practically all egg clusters are usually deposited by the end of August.

Unusual conditions complicate gypsy moth work at Connecticut infestation.--Large numbers of various stages of species of lepidopterous insects other than the gypsy moth were found in the shagbark hickory trees which abound in and near the gypsy moth infestation which was located in Southbury Township, New Haven County, Conn., late in June. From a distance the larvae and molt skins of some of these insects resemble gypsy moth egg

clusters, especially when partly hidden under the loose bark of the hickory. For this reason, it was necessary to climb most of the hickories in order to insure that no gypsy moth egg clusters should be overlooked.

Dry season permits early scouting of swampy areas.--Several gypsy moth crews in Connecticut scouted in areas which are normally swampy and usually accessible only when frozen over. The dry weather prevalent throughout New England during the last 4 or 5 months made it possible to work at these locations early in the season.

Small infestation located in Connecticut section of barrier zone.--A small gypsy moth infestation was recently found in Woodbury, located within the barrier zone in the southern part of Litchfield County, Conn. So far as is known, this is the first gypsy moth colony ever located in the township.

Gypsy moth work in Pennsylvania.--By September 1 the force of W. P. A. workers engaged in Federal gypsy moth work in Pennsylvania had been reduced to 58 men because of the necessity of dismissing all workers, except veterans, who had completed 18 months of continuous service. As a consequence, only a skeleton force was available for assignment to the various activities during the first part of the month. Many of the new workers requisitioned to fill the vacancies were inexperienced and required training in heavily infested areas before being assigned to regular gypsy moth work. The men available began, during the last week in August, to remove the assembling cages where no male gypsy moths were caught during the season. They continued to patrol the remaining cages, gradually collecting all those in locations where no further recoveries of male moths appeared likely, until the middle of September, when the removal of the cages was completed. Scouting work was started around infested sites, and the examination of trees, brush, driftwood, and other debris along the banks of the Susquehanna and Lackawanna Rivers where they pass through the generally infested area was begun. The scouting of the river banks was facilitated by the low water caused by the prolonged dry season, and all islands were easily reached either by walking across dry stream beds or by wading through very shallow water. However, this work progressed slowly because of the shortage of men experienced in this type of work and who were able to comply with the new W. P. A. regulations. Men working in the vicinity of abandoned mines were constantly on guard against stepping into mine cave-ins, as the openings are often small and completely screened by bushes and weeds. These holes are usually very deep, and if a man fell into one of them he might suffer severe injury and would have difficulty in getting out without assistance. A few workers in Pennsylvania were also engaged in quarantine-inspection work and in other special assignments.

C. C. C. gypsy moth work.--During the month of September a total of 2,832 6-hour man-days were used on C. C. C. gypsy moth work east of the barrier zone under the supervision of this Bureau, while 7,170 6-hour man-days were diverted from gypsy moth work and used on forest-fire-hazard-reduction work. Of the man-days taken from gypsy moth work, 4,654 were in Massachusetts, 512 in Connecticut, and 2,004 in Vermont. As usual during this season, the work consisted mainly of creosoting egg clusters and selective thinning to reduce the favored food plants at the sites of known

infestations. Very little scouting will be done while the foliage remains too heavy to obtain the best results from this type of work. A crew from one of the camps in Vermont, where no gypsy moth work has been done since the hurricane of 1938, was returned to gypsy moth work in September. During the first quarter of the fiscal year, ended the last of September, a total of 10,301 6-hour man-days was used on gypsy moth work, resulting in the destruction of 20,505 new gypsy moth egg clusters found while scouting a total of 3,107 acres and doing selective thinning work on 467 of those acres.

PLANT DISEASE CONTROL

Common and native barberries found in Montrose County, Colo.--Since survey work started in Montrose County in April, 1 agent with a crew of 4 men has covered approximately 150 square miles in the western part of the county where areas of both common (*Berberis vulgaris*) and native (*B. fendleri*) barberries have been found. Large and small escaped bushes have been found along fence rows, in orchards, on hillsides, and on ditch and river banks. Bushes found in orchards growing close to trees were dug, others were salted. Twenty-six farmers have assisted in the eradication of 456 bushes on 25 properties. Of these bushes, 374 on 24 properties were escapes. Farmers in southwestern Colorado, in the 5 counties where work is being carried on, have cooperated by furnishing storage space for salt and equipment, by assisting with the work, and by furnishing teams and tractors.

Supervisors in Iowa counties cooperate in barberry eradication.--Before barberry-eradication work is started in a county, a meeting is held with the County Board of Supervisors and the work explained in detail. A request is usually made for some financial assistance, usually for funds to be used in paying for transportation of crews or for hauling chemicals and equipment. County Boards have furnished $\frac{1}{2}$ -ton and $1\frac{1}{2}$ -ton trucks, including gas, oil, and upkeep, and allotments of funds to pay for (1) personally owned car mileage; (2) gas, oil, and storage for government trucks; and (3) leather boots for laborers. These boards of supervisors are usually glad to be of assistance in this work, as it hastens the removal of barberries growing within the county. The amount of financial assistance has not been great but the work has been very helpful, as it creates added interest in the project and helps to keep in touch with the members of these Boards as well as with other county officials interested in crop improvement. During the last summer 9 of the 12 counties in which work has been conducted have furnished some assistance. In 7 counties funds were allotted for maintenance and upkeep of cars, and in 3 counties leather boots were purchased for laborers. Direct aid from counties has amounted to approximately \$2,300 since January 1 and for the present year it will average about \$300 each month, exclusive of the leather boots that have been furnished.

Eradication work extended into Augusta County, Va.--The first county-wide survey for common barberry bushes in Augusta County, was initiated last month. Work began at Steele's Tavern and will continue northward. In 1935, winter wheat was seeded on 44,556 acres and 13,734 acres was seeded to other small grains in the county. Forty percent of the crop land harvested was planted to small-grain crops.

Exhibits placed at county fairs.--Educational exhibits on barberry eradication and stem rust control were maintained at five county fairs in Virginia from August 22 through September 23. Eradication of native barberry (B. canadensis) was stressed in the exhibits at Radford (Montgomery and Pulaski Counties), Galax (Carroll and Grayson Counties), and at Fincastle in Botetourt County, while the common barberry (B. vulgaris) was featured in the Rockbridge and Augusta County fair exhibits at Lexington and Staunton. In all cases the fair officials were very helpful and were anxious that we plan to place exhibits next year. Several tips were received on suspected common barberry locations in Rockbridge and Augusta Counties. Some of these locations have already been checked and common barberberries located.

Reconnaissance of foxtail pine carried on in California.--During August, members of the regional office of blister rust control at Oakland, Calif., and the National Park Service left the Giant Forest in Sequoia National Park with saddle and pack stock to make a reconnaissance of stands of foxtail pine (Pinus balfouriana) and other white pines of the Kern River basin in the High Sierra of California. The objectives of the trip were to study the distribution of foxtail pine and other white pines and Ribes, to report upon the general problem of blister rust control in the pine stands of the region, and to make preliminary recommendations as to possible blister rust control units. The basin of the Kern River in Sequoia National Park is accessible only by trail from both the western and eastern sides of the Sierra Nevada, hence all operations were conducted on foot or horseback. Two famous trails traverse the region, the John Muir Trail and the High Sierra Trail. Foxtail pine is found only in a few localized places in California, one of which is the upper Kern basin, where it reaches its best development and is the dominant white pine; hence in this region it is of notable botanical interest. Magnificent stands of this pine are traversed by the two principal trails serving the basin. Foxtail pine in its mature habit is a full-bodied, bushy-crowned, irregularly branched tree from 35 to 60 feet high, with a bright reddish-brown bark. On many of the trees the branchlets hang pendant from the branches or often project from them at all angles, even vertically on the younger trees, thus giving the foxtail effect and the name to the tree. The usual diameter is from 20 to 36 inches but trees were observed that measured nearly 5 feet in diameter. It is distinctly a timber-line tree, climbing the shoulders and slopes of the granite mountains, where it is the last vestige of tree growth. At timber line it is occasionally associated with white-bark pine (P. albicaulis), which seems to compete with it for altitudinal record. Foxtail is not restricted, however, to timber line; it grows in pure stands considerably below the limit of tree growth. It prefers rocky sites and sandy, well-drained soils, which it finds to perfection on sandy granite slopes, talus slopes, and moraines. From its unfailing presence on moraines and other glacial debris, where it grows nearly pure, it might be named the moraine pine. Where moisture persists the year round, as in the valley bottoms and moist swales, foxtail gives place to lodgepole pine. Its altitudinal range lies between 8,500 feet and timber line, which is roughly 12,000 feet, but most of the pure stands lie above 10,500 feet. Below 10,500 feet it is mixed with various proportions of lodgepole pine. The species of Ribes that were observed associated with foxtail

pine are, in numerical order, Ribes montigenum, R. cereum, and R. inerme. R. montigenum frequents moist situations among the lodgepole, seepages among the rocks, and draws at the heads of streams taking their origin in springs. Although some bushes of this species will offer resistance to eradication because of their rocky habitat, most of them can be eradicated without great effort. R. cereum habitually grows among the rocks; generally, however, it is not abundant. R. inerme apparently has an intermittent distribution; undoubtedly it is abundant in places along some of the streams.

Infected Ribes again found in Glacier National Park.--For the second year blister rust on Ribes has been found in Glacier National Park. Collected for the first time in 1938, steps were taken immediately to start survey and control work this year. This work is progressing satisfactorily on selected areas around the Park headquarters at Belton and at the head of Lake MacDonald, and on certain limber pine stands at Two Medicine Chalet. During August, C. C. C. workers cleared 848 acres of 145,941 bushes. It is expected that this work will continue until about October 15. Most of the rust has been located by scouts and control supervisors, all having been collected east of the Continental Divide and mostly on the Two Medicine campground area. It has been collected on Ribes viscosissimum and R. inerme leaves which with R. lacustre constitute the host bushes associated with Pinus flexilis at this location.

Ribes eradicated from over 77,000 acres in Northwest.--With a total of from 900 to 1,300 security-wage earners on the Bureau's blister rust control program and an additional 2,500 to 3,000 regular, W. P. A. and C. C. C. workers employed by the Forest Service and National Park Service, the season's accomplishments to the end of August showed 77,646 acres were protected by Ribes eradication. Of this total 27,961 acres, or 36 percent, is initial work and the remainder rework. In this acreage is included a large amount of cutover land where logging and burning disturbances have caused abundant Ribes germination. The average number of bushes per acre for all areas worked this year is 284. A summary of the acreage covered by each agency is as follows: Bureau, 30,003; Forest Service, 29,912; C. C. C., 15,008; State Cooperative, 2,723.

Blister rust exhibits attract attention at fairs.--Attracting visitors from the area immediately adjacent to extensive stands of western white pine timber, about 2,000 people viewed the blister rust exhibit at the Clearwater County, Idaho, Fair on September 15 and 16. Displayed in a bough-decorated booth were 25 colored pictures showing the disease, control methods, and camp life, the working tools of eradicators, and specimens of the disease on pine and Ribes. In addition, the story was presented with a continuous showing of colored slides. A new attraction which proved very successful was the use of 4-inch-lens hand magnifiers for close inspection of leaf infection. These proved particularly attractive to students, many of whom had their first opportunity to examine closely a disease they had studied in the classroom. Most visitors with whom the exhibit attendant talked have some knowledge of the disease and its control and are aware of the importance of white pine to Clearwater County and the State of Idaho. A blister rust control exhibit was placed in the Plants and Flowers Building at the Wisconsin State Fair, held on August 19 to 27, inclusive. This display attracted considerable attention. A blister rust exhibit at the Vilas County Fair held in Eagle River,

Wis., was seen by approximately 20,000 people. In Minnesota blister rust control exhibits were shown at 4 county fairs--3 in the St. Paul district, and 1 in the Duluth district. In Michigan a new blister rust exhibit was displayed at the State Fair, Detroit, Saginaw County Fair, Lenawee County Fair at Adrian, and the Hillsdale County Fair. The total attendance at these fairs was approximately 680,000 people. Much interest was displayed in the various exhibits. A. C. White, of Rhode Island, reports that the blister rust control demonstration at the State Fair at Kingston, R. I., was a great success this year and attracted more attention than ever before. The display showed a blister rust panel with an infected white pine and currant and gooseberry bushes in flower pots with narrow red ribbon running from the bushes to the panel and infected pine. There were from 2 to 4 men in attendance every day of the fair to answer questions and give information to interested persons. Many inquired about planting white pine.

Blister rust infection goes up in smoke.--H. E. Swanson, in charge of blister rust control in the Northwestern Region, writes that while he was on the Kaniksu National Forest during the latter part of September, the Forest Service burned a slash area, sending up in smoke more blister rust infection per acre than, in his opinion, was ever known in the history of blister rust control. He states that there were 120 acres in this particular area that was burned and he would estimate that 500,000 infected white pines and 360,000 infected Ribes were burned up during 1 afternoon. The area was burned absolutely clean and the fire was so hot that no Ribes germination is expected.

COTTON INSECT INVESTIGATIONS

Effects of some insecticides on cotton leaf aphids.--Studies were made this season by R. C. Gaines, M. T. Young, and assistants at Tallulah, La., and by F. F. Bondy, C. F. Rainwater, and assistants at Florence, S. C., on the effects of a number of arsenical and fluorine insecticides used in boll weevil control experiments on cotton leaf aphid populations. The aphids (principally Aphis gossypii Glov. with probably some A. medicaginis Koch) were more abundant than average in both localities and most of the treated plots became sufficiently infested toward the end of the dusting period to need aphid control. All the insecticides were applied as dusts, as needed for boll weevil control, the number of applications ranging from 3 to 8, depending on the intensity of the weevil infestation. The plots ranged in size from 1/30 acre to 1 acre, and were arranged in blocks selected at random and Latin squares with from 2 to 6 replications. At Tallulah the populations were determined several times during the season by counting the numbers of aphids on 1 square inch of leaf surface on the fourth leaf from the tops of the plants. One hundred leaves collected at random were counted on each plot, making a total of 100 square inches of leaf surface per plot for each count. At Florence the experiments were designed to determine whether nicotine bentonite and nicotine tannate mixed with calcium arsenate in equal proportions, and 0.5 percent rotenone added to several fluorine insecticides, would prevent development of a damaging aphid population when used throughout the season for boll weevil control. Populations were calculated for the entire leaf surface of 100 leaves per plot, selected at random from among the fourth leaves from the tops of the plants. No checks were used in the Latin squares at Florence but calcium arsenate was used in all experiments at both localities and can be used as the basis for comparison with the other insecticides. The figures given below are an index of the relative abundance of the aphids in the different treatments from the counts made when the

populations were at or near their maximum. Considering the aphid populations in the plots dusted with calcium arsenate as 1, the relative populations in the comparable plots in the other treatments were as follows: In the Tallulah experiments--checks, 0.28; 1-1 mixture of calcium arsenate and sulfur, 1.1; 1-2 mixture of calcium arsenate and sulfur, 1.1; sulfur, 1.6; synthetic cryolite (88-89 percent Na_3AlF_6), 1; synthetic cryolite (33 percent Na_3AlF_6), 0.64; synthetic cryolite (88-89 percent Na_3AlF_6) plus Lethane spreader, 0.79; synthetic cryolite (83 percent Na_3AlF_6), 0.15; calgreen, 1.2; di-calcium arsenate, 1.8; basic copper arsenate, 0.64; a French commercial calcium arsenate, 0.96. In the Florence experiments--1-1 mixture of calcium arsenate and nicotine bentonite, 0.41; 1-1 mixture of calcium arsenate and nicotine tannate, 0.50; synthetic cryolite (81.3 percent Na_3AlF_6), 0.61; synthetic cryolite (81.3 percent Na_3AlF_6) plus 0.5 percent rotenone, 0.14; synthetic cryolite (83.4 percent Na_3AlF_6), 0.29; synthetic cryolite (83.4 percent Na_3AlF_6) plus 0.5 percent rotenone, 0.12; synthetic cryolite (92.3 percent Na_3AlF_6) plus 1 percent Lethane spreader, 0.34; synthetic cryolite (92.3 percent Na_3AlF_6) plus 0.5 percent rotenone, 0.16; barium fluosilicate (75 percent BaSiF_6), 1.03; barium fluosilicate (75 percent BaSiF_6) plus 0.5 percent rotenone, 0.23. In the Tallulah experiments there were approximately 4 times as many aphids in the calcium arsenate and 1-1 mixture of calcium arsenate and sulfur treatments as in the checks, 5 times as many in the calgreen and 8 times as many in the di-calcium arsenate plots as in the checks. The cryolites and other treatments also increased the aphid populations considerably. In the Florence experiments the increase in aphids in the plots treated with barium fluosilicate was about equal to the calcium arsenate plots, but where 0.5 percent rotenone was added to the barium fluosilicate, the population was only one-fourth as great as in the calcium arsenate plots. The mixtures of calcium arsenate, nicotine bentonite, and nicotine tannate also held the aphid populations to less than one-half of those in the calcium arsenate plots. The populations in the plots treated with cryolites containing different percentages of sodium fluoaluminate likewise averaged less than one-half as heavy as in the calcium arsenate plots, and where 0.5 percent rotenone was added to the cryolites the populations were only about one-seventh as great as in the calcium arsenate treatments. Derris dust, cube dust, and nicotine sulfate were also added to the calcium arsenate used in other tests at Florence and in no case did a damaging aphid population develop in any of the plots that received rotenone treatments throughout the season. However, at Tallulah, a dust containing rotenone, 0.6 percent; Avirol, 1 percent; water, 1 percent; peanut oil, 0.5 percent, with talc as a carrier, applied after the infestations became heavy, failed to give satisfactory control. The heavy infestations were satisfactorily controlled with one application of lime and nicotine sulfate containing 3 percent nicotine.

New host plant of pink bollworm.--In the examination of 1,063 green seed capsules of *Malvaviscus drummondii* (Turk's cap) collected near lightly infested cotton fields at Brownsville, Tex., on September 15 L. C. Fife with the assistance from the Division of Pink Bollworm and Thurberia weevil Control found 1 larva of the pink bollworm (*Pectinophora gossypiella* (Saund.)). The determination was later verified by C. Heinrich. Additional examinations of 893 green seed capsules were made on October 5, but the results were negative. This appears to be the first record of *M. drummondii* as a host of the pink bollworm. The plant is widely distributed in woods, thickets, and along roadsides in southern and eastern Texas, and is also occasionally cultivated as an ornamental. Flower buds and green seed capsules of other malvaceous

plants, including Anoda pentachista, Sida angustifolia, Sida hastata, Wissadula holosericea, Malachra capitata, Malvestrum spicatum, and Hibiscus rosa-sinensis were examined during September, all with negative results. Large quantities of plants of these species have been caged for possible emergence of pink bollworm moths.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Inspection.--Inspection of the cotton crop is begun each year when cotton reaches the blooming stage and is continued through the maturity of the crop. These annual inspections are made for the purpose of obtaining data relative to the status of the pink bollworm infestation in regulated areas, and in order to locate any infestation outside of the regulated areas while still in the incipient stage. During September gin-trash inspection was continued in Texas, Louisiana, Mississippi, Alabama, Georgia, Florida, and Arizona, as well as in certain areas in Mexico adjacent to the border. Several findings of importance were made during the month. The first was at Anahuac, Nuevo Leon, Mexico, where several specimens of the pink bollworm were found for the first time. The other findings were in Texas, and involved Tom Green and Concho Counties, in the west-central part of the State. Inspection in all other areas was negative, including the Salt River Valley and Coolidge areas of Arizona, where worms were found last season.

Stalk destruction.--Field clean-up operations have been carried on each season in the lower Rio Grande Valley and Coastal Bend districts of the south Texas regulated area since the discovery of pink bollworm infestation in the counties comprising these districts in 1936 and 1938, respectively, in an effort to eradicate this very destructive cotton pest from this region. It is the policy to inaugurate control measures immediately as fields become available following the harvesting of the cotton crop, and stalk-destruction work was well advanced this season in the lower valley district by the middle of August. Inspection of the 1939 cotton crop during July and August indicated there was a considerable increase in pink bollworm infestation in the southern part of Cameron County and lighter infestations in all other regulated counties. A light pink bollworm infestation was also found for the first time in several counties lying outside the south Texas regulated area, but adjacent thereto. The stalk-destruction program was interrupted to a considerable extent during September by heavy rains which fell over practically all of the south Texas area during an approximate 2-week period. This, of course, retarded the work in all areas and prevented a considerable part of the cotton acreage being in compliance as to having all living stalks removed from fields in the lightly infested zone of the lower valley district by September 15, in order to be eligible for the payment of 50 cents per acre, to assist farmers in this work. The Federal Government is paying all expense incident to stalk removal in the heavily infested and generally and substantially infested zones. All stalks had been removed from the heavily infested zone in the southern portion of Cameron County and plowing of stubble was in full force at the time the rains began. This same condition existed over a considerable portion of the remainder of the lower valley district. During the last week in September stalk-destruction work made rapid headway, and very few fields of stalks were standing at the close of September 30. The plowing out of stubble also made very satisfactory progress, approximately 500 acres remaining unplowed at the end of the month. Those fields in the lightly infested zone in which stalks were

destroyed after September 15 will, of course, not be in line for Federal payment for destruction of stalks, but stalks were destroyed prior to October 1 to comply with the State regulation to that effect. In the Coastal Bend counties, all of which lie within the lightly infested area, very few stalks remained standing at the end of September, but considerable plowing out of stub cotton remained to be done. Approximately 5,000 acres of cotton land was in noncompliance in that district on October 1 in regard to participating in payment from the Federal Government for stalk-destruction work, but it was expected that most of this acreage would be in compliance with the State proclamation requirement, which is October 15. Cooperative stalk-destruction work in the lower Rio Grande Valley of Mexico made very good progress during September despite approximately 2 weeks of rainy weather during the middle of the month. Eleven inspectors of this Division with cars assisted the Mexican inspectors in this work. At the close of September, 4,234 of the 4,833 growers in the Mexico areas had either completed plowing their cotton lands or were working toward completion, and a determined drive was under way to start the remaining growers to work.

Revision of Federal pink bollworm quarantine.--During September the Federal pink bollworm quarantine regulations were amended to include the Texas counties of Dimmit, Duval, Frio, Jim Hogg, La Salle, Maverick, Webb, Zapata, and Zavala, because of the finding of new areas of pink bollworm infestation. This amendment also added okra to the list of articles requiring certification when moved from regulated areas. This action was brought about because of the finding of a light pink bollworm infestation in okra in the lower Rio Grande Valley district by the Bureau Research Division in August. Several additional findings of pink bollworm infestation in okra were reported in September. A permit system for the handling of okra was completed and approved in September, and the placing of all okra producers under dealer-carrier permit is expected to begin early in October. In Cameron County, particularly in the area where cotton was rather heavily infested with the pink bollworm, okra growers were asked to cooperate with the control program by grubbing out all of their spring-planted fields. This comprised some 50 fields in the area near Brownsville, several of which were found to be infested with the pink bollworm. All of these okra plantings were destroyed by the close of September. In other sections owners are asked to destroy their okra plantings immediately after inspection shows them to be infested. Good cooperation has been given in this work.

Situation in the Big Bend.--In the Big Bend section of Texas and Mexico interest has recently been centered on the outcome of the joint international program, inaugurated in the spring of 1938 in an effort to reduce the extremely heavy pink bollworm infestation in the Presidio-Ojinaga section of the Big Bend. Evidence during the past few months has definitely pointed to a very satisfactory outcome of this 2-year plan, which was brought to a close with the maturity of the 1939 cotton crop. The absence of pink bollworm damage in the cotton crop in September has eliminated all doubt as to the remarkable success of the measures carried out in this area separated by an international boundary, through cooperative efforts of the two countries. At Presidio around 700 bales of cotton were ginned for the period, and it is not believed any bale will grade lower than middling, with a very high percentage grading strict middling. In the Ojinaga, Mexico, area, the few bales ginned for the month graded middling or better. It is estimated that there are less than 1,500 acres in cotton in the Presidio section this year, whereas

normally this figure would be around 3,000 acres. Many farmers in this area now express regret at not planting their allotted acreage under the A. A. A. program. It is believed that this reduction in acreage is largely due to fear of the pink bollworm, while the optimism of the growers for next season is due entirely to the present pink bollworm status. It would seem that this attitude clearly indicates the farmers' confidence in the control measures that have been in effect for the last 2 years. Most of the growers now plan to plant their full allotment next season. Cotton growers in the Ojinaga area also appear to realize and appreciate what has been accomplished through control efforts and state that they intend to plant a much larger acreage next year, as they now see that cotton can be produced without heavy losses from pink bollworm.

Wild-cotton eradication work in southern Florida.--The eradication of wild cotton has been carried on in southern Florida and adjacent keys each season since the discovery of pink bollworm infestation in these plants some years ago. This wild cotton is perennial and grows into trees. It has no commercial value, but serves as a host to the pink bollworm, from which it was discovered this most destructive of cotton pests was migrating to domestic cotton plantings in northern Florida and southern Georgia. Wild-cotton eradication is carried on through the provision of Work Projects Administration allotments, supplemented by funds provided by this Bureau. Eradication work was inaugurated this season on the Keys subdistrict on September 18, with approximately 22 W. P. A. laborers. By the end of the month this force had been increased to 39. The situation relative to the destruction of wild cotton plants is very favorable. A total of 660 acres was cleaned for the period worked during September and only 2,506 wild cotton plants were found, of which about 2 percent had mature fruit. A total of 300 mature bolls were inspected with negative results as to pink bollworm infestation. Efforts were begun some time ago toward obtaining authority for the establishment of a C. C. C. camp on Cape Sable, where the greater portion of wild cotton occurs, to aid in this undertaking, and arrangements to this end were finally consummated. During the first part of September inspectors of the Florida division gave considerable assistance to the Army and Forest Service in the erection of a side camp at Royal Palm State Park, incident to the repairing of roads to Cape Sable and the establishment of the main C. C. C. camp. The Forest Service occupied the side camp during part of the period, with 75 enrollees, and began repairs on the Cape Sable roads. Not a great deal of progress was made, however, toward establishment of the permanent camp, owing to bad weather, mosquitoes, and lack of adequate road equipment. Toward the end of September adequate machinery was received, and it was anticipated that the work incidental to the establishment of the C. C. C. camp would be accelerated.

Thurberia-plant eradication.--An effort has been under way for a number of years to eradicate the Thurberia plant from the mountain ranges in southern Arizona adjacent to cotton plantings. This wild plant is closely related to domestic cotton and is infested with Thurberia weevil, an insect very similar to the common boll weevil, and attacks domestic cotton in much the same way. A recheck of the Tortillita Mountains, which were covered in 1935 and 1936, when this work was first begun, is now in progress. Despite the fact that we were unable to get our requisitions for W. P. A. labor filled during September, good progress was made in the work of locating and destroying Thurberia plants in this mountain range. During the period 1,141

man-days was applied to *Thurberia* eradication. A total of 8,640 acres was covered and 5,241 *Thurberia* plants were located and destroyed.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Three types of cryolite give similar control of tomato fruitworm.--As a result of experiments in three fields of early crop tomatoes, J. Wilcox, of the Alhambra, Calif., laboratory, reports that the percentage of tomato fruits damaged by *Heliothis armigera* (Hbn.) was reduced from an average of 14.4 percent in undusted plots to 3.2, 3.2, and 3.1 percent in plots dusted with imported synthetic cryolite, natural cryolite, and domestic synthetic cryolite, respectively. This constitutes about 78-percent control. Twenty different field plots were dusted with each type of cryolite. Half of these were dusted with undiluted cryolite and gave better results than did half dusted with cryolite diluted with talc to contain 70 percent of sodium aluminum fluoride (Na_3AlF_6). A bait containing corn meal and cryolite (10-1) by weight, gave similar results to the diluted cryolite dust mixture. A bran-cryolite bait gave intermediate results, whereas a bran-cryolite-corn oil bait, a sawdust-cryolite-corn oil bait, and undiluted calcium arsenate dust, gave inferior results.

Lygus species injurious to sugar beet seed.--O. A. Hills, of the Phoenix, Ariz., laboratory, reports that a recent survey of 25 fields of sugar beets grown for seed in the Salt River Valley of Arizona in 1939 demonstrated that two species of *Lygus*, principally *Lygus pratensis oblineatus* (Say) and *L. hesperus* Knight, were found to be associated with the production of a large percentage of nonviable seed. Populations of other insects in the seed beet fields did not correlate with the percentage of seed viability. Similar surveys were made in the beet seed growing districts of Albuquerque, N. Mex., and Salt Lake City, Utah, and although a definite trend was observed toward a greater production of nonviable beet seed in the presence of *Lygus* populations, the samples examined were too few to serve as a basis for definite conclusions. An examination of seed borne by plants grown in cages stocked with *Lygus*, involving the introduction of 1,551 *Lygus* adults and nymphs on seed beets during their prebolting stage, demonstrated great differences in the production of seed and in the percentage of viability of the seed, in the cage where these insects were introduced, as compared to a similar cage where the beets were grown in the absence of insect infestation. Specifically, there were 1,387 grams of beet seed showing a viability of 91.0 percent produced in the cage where *Lygus* was excluded, as compared to only 68.4 grams possessing a viability of 0.33 percent produced in the cage where *Lygus* was present. A seed analysis from similar isolation cages where leafhoppers of the genus *Empoasca* had been introduced demonstrated that, while the yield of seed was reduced materially by heavy infestations of these leafhoppers, the viability of the seed was not greatly affected.

Little change in percentage of bulbs infested by narcissus bulb fly in Pacific Northwest.--The annual survey conducted during the summer of 1939 by C. F. Doucette, of the Sumner, Wash., laboratory, and his associates for the purpose of determining the extent of narcissus bulb infestation by *Meron equestris* (F.) disclosed that the percentage of infested bulbs ranged from less than 1 to approximately 21 percent, with an average of 5.3 percent out of 29 stocks examined in Washington and Oregon. The variety King Alfred

was examined in all cases and double-nosed bulbs were used in order to avoid the influence of varietal and size factors. In most instances the bulbs had been graded so that they were well mixed and 10 samples of 100 bulbs each were usually taken for examination. Where graded bulbs were not available 40 samples of 25 bulbs each were examined. During the preceding 4-year period the percentage of bulbs infested by the bulb fly in the same locations ranged from 4.4 to 5.5, indicating that for the last 5 years there has been, in general, no very extensive change in the extent of infestation by M. equestris.

Cryolite effective against hornworms on cigar-binder tobacco.--F. S. Chamberlin, A. H. Madden, and L. L. May, of the Quincy, Fla., laboratory, report that a preliminary control experiment with a cryolite dust mixture directed against Protoparce quinquemaculata (Haw.) and Protoparce sexta (Johan.) on the newly introduced cigar-binder type of tobacco indicated that this material was effective against hornworms under the conditions encountered. The cryolite dust mixture containing 80 to 85 percent of sodium aluminum fluoride applied to the tobacco at weekly intervals throughout the period of infestation by hornworms exerted a more effective control of these pests than did a paris green and lime mixture (1-6). Owing to the burning hazard accompanying the use of the paris green dust mixture, applications of this poison were directed into the center of the space between the tobacco rows, whereas the cryolite was applied directly to the tobacco foliage, as this material does not ordinarily burn tobacco. The diverse methods of application produced relatively greater deposits of cryolite on the tobacco leaves than did the paris green mixture, which possibly explains, at least in part, the greater effectiveness of the cryolite. Even though the cryolite dust mixture was applied directly to the tobacco foliage under very adverse weather conditions the leaves showed only a slight trace of burning. The paris green and lime mixture, however, burned the leaves appreciably. Light deposits of cryolite washed quite readily from the tobacco leaves during showers but heavy, uneven deposits of the material remained as an objectionable residue upon the cured product. While the results of this experiment indicate that cryolite possesses definite promise as an insecticide for controlling hornworms in the Florida district, the physical character of the material now available must be improved before it can be used successfully as a dust mixture by the tobacco growers. These general conclusions were confirmed by the experience of a local tobacco grower who used cryolite on his tobacco.

Dichloroethyl ether protects melons from wireworms.--Results of experiments by M. W. Stone, of the Ventura, Calif., laboratory, indicate that Zucca melons can be protected effectively against the sugar beet wireworm (Limonijs californicus (Mann.)) by applications of a water solution of dichloroethyl ether at concentrations ranging from 2 to 4 cc. per gallon, applied at the rate of 1 quart of the solution to each hill prior to the planting of the seeds, supplemented by a second application of the same dilution and dosage 3 weeks later, without causing detectable injury to the plants. In the process of conducting these experiments shallow excavations approximately 1½ inches deep and 8 inches in diameter were made as a foundation for each hill, and the dichloroethyl ether was applied at concentrations of 2, 3, and 4 cc. per gallon of water at the rate of 1 quart of the solution to each excavation in the respective experimental plots. After the solution had entered the soil four seeds of the Zucca melons which had

previously been sprouted were planted in the excavation and a small quantity of the treated soil was placed over the seeds. Similar plots which did not receive dichloroethyl ether applications were retained as checks. At the end of the first week the hills treated with the 2-cc. concentration had an average of 0.71 wireworm larva per hill, the 3-cc. concentration had 0.25 larva per hill and the 4-cc. concentration 0.32 larva per hill, whereas there were an average of 6.4 larvae per hill in the plots not receiving dichloroethyl ether treatments. Examinations at the expiration of 3 weeks from the initiation of treatment disclosed that a total of 10.4, 10.8, and 6.7 percent of the melon plants were killed by wireworms in the 2-, 3-, and 4-cc. dilutions, respectively, whereas 65 percent of the melon plants were killed in the plots not receiving any treatment. At the expiration of 32 days, the second application having been made in the meantime, the percentage of the melon plants killed had increased to 27, 18, and 13, respectively, for the three different dilutions of dichloroethyl ether whereas there was no increase in the number of plants killed in the check plot, which during the interval had received one treatment of the dichloroethyl ether application in order to prevent further reduction in the number of plants.

Control of red spider on greenhouse cucumbers.--Tests completed recently by C. A. Weigel and G. V. Johnson, of the Beltsville, Md., laboratory, indicate that, on the basis of examinations made of all living red spiders (Tetranychus telarius (L.)) found on representative samples of cucumber foliage from plants grown in the greenhouse, which were given a total of nine applications of a derris-pyrethrum-sulfonated castor oil spray, this combination proved superior to an equal number of applications of sprays composed of a commercially prepared thiocyanate, thus confirming the results obtained during the preceding three seasons. Under the conditions of this experiment there were no differences revealed in the numerical production of cucumbers from plants treated with these two sprays, but the per-plant production was considerably reduced in the check plots. It should be emphasized, however, that the plants in the check plots produced a higher percentage of Grade No. 1 cucumbers than the plants subjected to either of the spray treatments, indicating the possibility of mechanical injury to the flowers or young cucumbers by the spray. The derris-pyrethrum-sulfonated castor oil spray did not cause detectable injury to the cucumbers but some injury, directly attributable to the treatment, resulted on the plants to which the thiocyanate spray was applied.

INSECTS AFFECTING MAN AND ANIMALS

Bonneville Dam and its relation to mosquito pest.--H. H. Stage, of the Portland, Oreg., laboratory, reports the following observations on the effect of the construction of the Bonneville Dam on mosquito production: "Since the controlled elevation of water surface in the Columbia River has been radically changed by the construction of the dam, it is apparent that old breeding areas may now be permanently flooded and entirely new areas be rendered suitable for oviposition by Aedes vexans Meig. and A. lateralis Meig. For the third consecutive year data have been recorded on the relationship of the construction of the dam and mosquito breeding. These data have included records on the numbers of larvae and adults occurring above and below the dam by field inspections and light traps, respectively. At present it appears that the mosquito population above the dam has been considerably reduced. In certain restricted localities there is no longer

any pest whatever since the original egg beds are now permanently under several feet of water. It is fortunate that the banks are generally steep, rather than gently sloping as in many of the original willow flats. The total number of acres permanently submerged amounts to 4,250, of which 2,660 acres was covered with a dense growth of willows and cottonwoods, regarded as mosquito-breeding areas. The number of acres periodically flooded by an average high water under present (controlled) conditions now amounts to 878, or a reduction of some 1,782 acres. This total of 878 acres, now considered as potential mosquito-breeding areas, occurs in greater or lesser size from the dam to The Dalles. Mosquito breeding is considerably reduced therefore at practically every point along this 50 miles of river. In the vicinity of Hood River, for example, some 286 acres of mosquito-breeding grounds has been flooded by natural water levels (before construction of Bonneville Dam). This acreage has been reduced to 62 acres by controlled water levels (after construction of Bonneville Dam).

Miami Beach, Fla., eliminates sandfly-breeding areas.--J. B. Hull, of the St. Lucie, Fla., laboratory, reports that following a survey by the personnel of his station, to determine the sandfly-breeding areas in the vicinity of Miami Beach, that city eliminated the areas within the city limits by filling with spoilage pumped from the bay. Apartment buildings are now being erected on the reclaimed areas.

Mixtures containing derris and nicotine for control of Gulf coast tick apparently injure eyes of animals.--Tests conducted at the Valdosta, Ga., laboratory on various tickicidal materials indicate that mixtures containing derris and nicotine, when repeatedly applied to the insides of the ears of animals to kill or repel the Gulf coast tick, cause injury to the eyes. The injury is manifested by the appearance of a white opaque area in at least a part of the affected eye.

Diphenylamine a promising tickicide.--Diphenylamine, recently shown to be an excellent screwworm larvicide, in preliminary tests is indicated to be a good tickicide against the Gulf coast tick (Amblyomma maculatum Koch).

FOREIGN PLANT QUARANTINES

Insect passengers from Europe.--When the S. S. Veendam arrived at New York on September 5 from the Netherlands, several adult specimens of Pieris rapae (L.) were taken alive in a passageway just outside of the refrigerator room. This ship brought back a large number of American citizens returning home before the outbreak of the European War and it was necessary to take on an excess of staple stores before sailing. Owing to a lack of space, a considerable quantity of cabbage was piled outside of the refrigerator. The cabbage was evidently infested with immature stages of P. rapae. This note is of interest in that it illustrates the possibility of insect pests, taken on board in some foreign country in the immature stages, completing their life cycle while in transit and flying ashore when the ship docks at some United States port.

Bulb inspection.--Although reports of bulb inspections are far from complete, it is evident that interceptions of Botrytis galanthis on Galanthus bulbs are far more numerous than they were last year. In addition, there have been over 50 interceptions of an undetermined sclerotial disease

on Galanthus bulbs. Ditylenchus dipsaci has been found on Chionodoxa, hyacinths, bulbous iris, Muscari, and Scilla, infestation being rather light in general.

Entomological interceptions of interest.--Six living larvae of the fruitfly Anastrepha mombinpraeoptans Sein were intercepted at New York on May 15 in a mango in ship's stores from Cuba. Living and dead larvae of the Mediterranean fruitfly (Ceratitis capitata Wied.) were intercepted at Boston on July 23 in tangerines in ship's stores from Brazil. A living larva of the elaterid Ischnodes sanguinicollis Panz. was taken at Washington, D. C., on May 29 in soil around azalea in the mail from Germany. A living specimen of the tingitid Acalypta musci (Schr.) arrived at Chicago on July 12 with moss packing around unidentified plants in the mail from Switzerland. A living larva of the weevil Listronotus latiusculus (Boh.) was found at Brownsville, Tex., on June 25 in a carrot in baggage from Mexico. Living specimens of the scale insect Aulacaspis mangiferae Newst. were intercepted at San Juan, P. R., on June 3 on a mango in baggage from Trinidad. A living adult of the scarabaeid Dyscinetus picipes (Burm.) was taken at New Orleans on April 22 on a pineapple fruit in cargo from Cuba. A specimen of the pentatomid Mecistorhinus piceus (P. B.) var. arrived at Galveston, Tex., on April 20 with banana debris in cargo from Guatemala. Two living larvae of the turnip gall weevil (Ceutorhynchus pleurostigma Marsh.) were intercepted at New York on February 22 in white turnip roots in ship's stores from Algeria. Living larvae of the pyralidid Diaphania indica (Saund.) were collected on March 3 on watermelon leaves in the field at Inarajan, Guam. A living adult of the cyphonid Ora nigricornis Champ. was found at Charleston, S. C., on May 29 on a banana leaf in cargo from Guatemala. A living specimen of the earwig Paracosmia tolteca (Sc.) was intercepted at San Francisco on March 14 with orchids in express from Mexico.

DOMESTIC PLANT QUARANTINES

Under Secretary Wilson visits grasshopper areas.--As head of the Great Plains Regional Traveling Conference, the Under Secretary, M. L. Wilson, while touring the Southwest relative to various agricultural projects, visited on August 28-30, certain areas in which grasshopper control activities were carried on last season. Observations were made of grasshopper infestations of various types in New Mexico and Texas, including areas in the latter State from which the long-winged hopper has been largely eliminated through control operations.

Losses from grasshoppers not more than 2 percent in heavily infested areas of Great Plains.--In determining the results of the current year's grasshopper baiting campaign in the Great Plains region, it is found there has been a high degree of control, owing to the combined effects of the work carried on by the Bureau in cooperation with local agencies in controlling migratory species, and the work conducted by farmers on their own premises against crop hoppers. Losses are confined principally to isolated farms where no effort was made to control the grasshoppers and to localized light-soil areas. Some of these farmers reported complete loss; others from 10 to 25 percent or more, but these areas were so small that it is believed the average loss from hoppers last season did not

exceed 2 percent of the value of the crops in the heavily infested areas. This was not entirely due to artificial control operations, but to man's effort and natural factors combined. The gray flesh flies, which lay tiny maggots on adult grasshoppers, appeared about 3 weeks earlier than in 1938 and infested about 25 percent of the hoppers in some localized spots. In limited areas, diseases of grasshoppers played a part. This was most noticeable in the Mississippi Valley States. The rains assisted in the control work in some respects, but hindered man's efforts to spread bait. Rains in April brought out a tender growth of vegetation, which tended to prevent migration of grasshoppers and resulted in large effective kills by applications of poison bait.

Several million dollars saved in one Minnesota county through grasshopper control.--In the Red River Valley of Minnesota, it has been estimated that more than 5 million dollars' worth of crops was saved from grasshopper destruction in half of 1 county. The reporting State cooperator declares he has gone into this estimate very carefully among farmers and growers in that section, and that they definitely agree upon the savings reported and attribute practically the entire crop in that half of the county to the results of the effective baiting program during this season.

Grasshopper surveys.--Following the survey of adult grasshoppers, which was completed in September, a survey of grasshopper eggs was begun after a series of regional meetings with supervisors, at which methods and procedures were outlined. By the close of September the egg survey was well under way in all States except Arizona and Arkansas, where the egg laying was late. The reports thus far indicate that the grasshopper infestation next season will be more serious in some of the northern Great Plains States than had been indicated by the adult survey.

White-fringed beetles not found at seven formerly infested localities.--Intensive eradication measures have been repeatedly applied in the current season at several isolated points where light infestations of white-fringed beetles were found last year, with the result that thorough inspection has failed to show that any such infestation exists at the following points: Taylorsville, Collins, and De Lisle, Miss.; Baton Rouge and Lake Arthur, and the parishes of Saint Tammany and Plaquemines, in Louisiana. Fumigation with carbon disulphide in the spring was the method employed at three of the above points, including Baton Rouge, where a rather severe infestation of larvae was found in the spring. In addition, intensive applications were made of herbicidal spray and of calcium arsenate or cryolite dusts.

Data on emergence of white-fringed beetles.--In order to determine the most effective time for applying control measures, a study has been made this year of the period of emergence of white-fringed beetle adults in the various infested areas. Cages were placed at various points and it is believed that the trapping records gave a reasonably accurate indication of adult emergence. It was found by the above method and by field inspection that emergence began late in May in most of the areas and continued until late in August, although in New Orleans, La., and Saucier, Miss., emergence continued throughout September, and at Monroeville, Ala., beetles were plentiful that month. Adult beetles of Pantomorus peregrinus Buch. continued to be found after those of P. leucoloma Boh. had disappeared.

July 14 marked the high point of emergence at Florala, Ala., New Orleans, La., and Gulfport, Bolton, and Carriere, Miss., and the latter point had another peak on June 8. The peak emergence at Saucier, Miss., occurred about August 19.

White-fringed beetle activities.--The control activities which have been carried on intensively since the first of June throughout the infested areas of Florida, Alabama, Mississippi, and Louisiana were largely discontinued after the first week in September, owing to the scarcity of beetles. In the eradication areas, such as that at Mobile, Ala., dusting with calcium arsenate was continued as long as a beetle could be found and proved very effective in ridding the area of adults. Suppressive measures were also applied at Florala, Ala., and Laurel, Miss. The cotton-ginning and peanut-picking operations in the infested areas in September necessitated increased activity on the part of the regulatory force in making the necessary arrangements with operators as to measures essential to the issuance of dealer-carrier certificates. In the Gulfport and Bolton, Miss., areas, cotton from infested fields was fumigated before being taken to the gins. It was found that carbon disulphide produced a 100-percent kill of adult beetles.

White-fringed beetle clean-up activities declared a godsend.--"The sections of our city where this project (white-fringed beetle control) has been in effect is by far cleaner and more respectable looking than at any time since I can remember, and that is a long time," declared the manager of a southern city in a recent letter, recounting the tremendous volume of debris that has been disposed of and urging an extension of the activities to cover the entire city. While the comment has an amusing angle, we believe it represents a wholesome attitude, in that the clean-up work is found to go far, not only toward controlling the infestation but also in abating unsanitary conditions and eliminating fire hazards.

Status of peach mosaic disease.--In the 1939 inspection work which has now been completed in most of the States, the peach mosaic disease was found in 53 counties of 7 States. There are 10 counties in which the disease has been found in the course of the cooperative Federal-State campaign of the last 4 years, in which no such disease was found in 1939. Of these counties, 7 are in Texas, 2 in Colorado, and 1 in Utah. The incidence of the disease has increased in the last year, however, the highest percentages of increase occurring in California, Arizona, and Oklahoma. In Colorado, where growers and others have been very active in removing diseased trees as soon as they are located, there was a reduction of 441 mosaic trees in the past year, 4,654 having been located this season.

Peach mosaic found in another Texas county.--A diseased peach tree found last July in Gregg County, Tex., has been definitely determined as affected with peach mosaic disease. This is the first report of peach mosaic from that county.

Fall inspection of peach nursery stock.--The recent reinspection of peach nursery and budwood properties in the regulated areas of the Southwest has resulted thus far in finding the peach mosaic disease in two Texas orchards. This is the only nursery, of those which were found eligible

for certification last spring, in which mosaic trees were found on re-inspection just prior to defoliation.

Peach-tree-removal work.--In September the work of taking out diseased, abandoned, and escaped peach trees was continued in Alabama, Arkansas, California, Colorado, Georgia, Oklahoma, South Carolina, Tennessee, Texas, and Utah. An average of 459 relief workers was employed on the project. Requests for the removal of such trees have come from the growers of several States. Of special note is the activity on the part of 26 Georgia peach growers who have recently destroyed, or "dehorned" for removal, over 4,700 peach trees which they inspected and found to be phony. In Oklahoma, N. Y. A. labor supplied by the county agent of Bryan County destroyed over 200 mosaic trees, which completed the destruction of the entire 400 or more such trees found infected in that county this year. The disease is not known to exist elsewhere in Oklahoma.

Nurserymen of Texas and Oklahoma provide growers with healthy stock for diseased peach trees removed.--The Nurserymen's Association of Oklahoma is furthering the control of the peach mosaic disease by agreeing to furnish healthy young nursery trees to growers who remove diseased trees from their property in accordance with the Federal-State cooperative program. Such assistance has also been extended by the Texas Nurserymen's Association in support of the program for the control of the phony peach and peach mosaic diseases.

The phony peach situation.--Throughout the 10 lightly infected States there has been a reduction of nearly 86 percent in the phony peach disease since 1936, less than 400 phony trees having been found in these States in the current season up to September 1. No phony trees were found this year in 3 formerly infected States--Indiana, Maryland, and Pennsylvania. The disease has apparently been eliminated also from nearly 100 entire counties in the more heavily infected States, and throughout the entire region there were 209 counties formerly known to be infected, in which no phony peach disease was found this year.

Correction in statement as to phony peach disease in Illinois.--On page 30 of the News Letter dated September 1, 1939, a statement was carried to the effect that no phony peach disease was found in Illinois in 1937 or 1938. It is desired to qualify that statement with the information that two phony infected trees were found in that State in 1937 and none in 1938.

No sweetpotato weevils found in eight formerly infested counties.--On checking up on the status of sweetpotato weevil infestations since the control and eradication activities were begun cooperatively with the States a little over 2 years ago, it is found that there are eight counties, formerly known to be infested, in which the weevils could not be located in this season's inspection. These counties are Conecuh in Alabama; Camden and Charlton, in Georgia; Greene, Jeff Davis, and Lawrence, in Mississippi; and Smith and Upshur, in Texas. A marked reduction in the number of infested properties in other counties in the regulated areas has also been effected.

Sweetpotato weevil survey in Arkansas and Texas.--The survey of properties outside quarantined areas was extended in September into seven

counties in southwestern Arkansas, including the commercial area bordering on Louisiana. No sweetpotato weevils were found. In Texas, preliminary surveys in several nonregulated counties resulted in finding an infestation in parts of the counties of Bastrop, Lee, Milam, and Williamson, and weevils were also located in Walker County.

Species of Ipomoea infested with sweetpotato weevils.--In a recent cursory survey of wild host plants of the sweetpotato weevil in the heavily infested areas of Baldwin and Mobile Counties, Ala., the weevils were found infesting the following species of the genus Ipomoea: pes-caprae, littoralis, speciosa, pandurata, caroliniana.

Violations reduced 15 percent in past year.--The number of shipments moved in apparent violation of Federal domestic plant quarantines in the fiscal year 1939 has been reduced more than 15 percent from the previous year, according to a recently prepared summary of interceptions. In the 3,641 infringements found by transit inspectors in the year ended June 30, 1939, articles not meeting quarantine requirements were found to have been consigned to every State in the Union except Nevada and Rhode Island, as well as to Alaska, Canada, the Canal Zone, and Puerto Rico. Cooperators in California reported 78 apparent violations of Federal quarantines and those at Jacksonville, Fla., 131 such violations.

Shipments inspected in past year.--Over a million shipments of nursery stock, plant products, and other restricted articles were inspected in the fiscal year 1939, to determine whether they had been certified in advance in accordance with quarantine requirements. Such inspections were made at railway centers in Atlanta, Boston, Chicago, Cincinnati, Council Bluffs, Dallas, Detroit, Indianapolis, Jacksonville (Fla.), Kansas City, Minneapolis, New York, Omaha, Philadelphia, Pittsburgh, Springfield (Mass.), St. Louis, and St. Paul.

Transit inspectors find live insects in shipments.--Two violations of the Insect Pest Act were recently noted by transit inspectors and reported to the responsible Division--one consisting of a shipment of live crickets, seen at Cincinnati; the other of live grasshoppers, seen at New York City.

Citrus canker work.--The activities in September were continued in Harris County, Tex., principally in Houston and suburbs. Over 3,000 properties and nearly 42,000 citrus trees were inspected during the month. Of this number over 34,000 were destroyed. No infections of citrus canker were found. R. N. Dopson, Jr., who was assigned temporarily to the White Fringed Beetle Project during the summer months, returned to the citrus canker work on September 1.

INSECTICIDE INVESTIGATIONS

Insecticidal possibilities of antimony salts.--C. M. Smith has just finished reviewing all the available literature concerning insecticidal tests and recommendations for the use of antimony compounds in the control of insects, and has prepared a paper on the subject which will, it is hoped, be presented at the meeting in New York City of the Eastern States Branch of the American Association of Economic Entomologists, to be held November 16 and 17.

The paper may be summarized as follows: Of all the antimony salts available, only potassium antimonyl tartrate, known as tartar emetic, has found any real application in the field of insecticides. It has long been recommended for the control of numerous species of ants, has shown promise in the control of West Indian and Mexican fruitflies, and has most recently become the accepted means of chemically controlling gladiolus thrips, with promise that it will also be applicable to other thrips such as those on iris and lemons. A great variety of antimony salts are available for further experimentation. Their price, materially higher than that of arsenic, will preclude their use except under special circumstances. They are quite toxic to man, but in a considerably lesser degree than arsenic, and the phytocidal activity also appears to be much less; it is this fact that may give them some special usefulness. Spray residues may reach considerable magnitudes but, at least in the case of those from the use of tartar emetic solutions, are apparently easily removed by rain or washing. Methods for determining the residues are fairly satisfactory with regard to both convenience and delicacy.

Differences in types of cryolite demonstrated.--R. H. Carter has prepared a note for the Journal of Economic Entomology in which he points out that the three types of insecticidal cryolites on the American market differ markedly with respect to pH and titratable acidity. The synthetic product of domestic manufacture is quite basic, the pH running from 7.45 to 8.10; the natural product from Greenland is more nearly neutral, running from 6.00 to 7.10 in pH; and the imported synthetic material is almost always quite acid, the pH running from 6.10 to 3.60, and the titratable acidity (methyl red indicator) amounting in some cases to the equivalent of 2.6 percent sulfuric acid. It is suggested that this acidity may have some connection with the phytocidal effect of some cryolites.

BEE CULTURE

Occurrence of American foulbrood governed by age of larvae.--A recent study by A. W. Woodrow, of the Internountain States Bee Culture Laboratory, at Laramie, Wyo., indicates that only young larvae are in danger from infection by American foulbrood. In a report on this work he states: "In connection with the tests on comparative physiological resistance or susceptibility it seemed desirable to learn the time at which the brood must be fed infected material if it is to become diseased. In one test on this question the queen of Colony No. 91 was caged on an empty comb on June 22-23. On June 29 this brood, at the age of 6-7 days (counting from the time the eggs were laid), was inserted into a badly diseased colony. The same queen was caged on June 27-28 and the resulting brood also inserted into the badly diseased colony on July 3, at the age of 5-6 days. No brood in either comb became diseased. In a second test the queen of colony 29 was caged for 5 consecutive days (July 19-24), each day on an empty, clean comb. These combs of brood were inserted into a badly diseased colony on July 26 for exposure to infection. The brood at the time of insertion ranged from eggs and hatching larvae to brood 6 to 7 days old. It is surprising that only the brood 4 days old or younger at the time of exposure to disease became infected." In short, according to these results, only larvae not more than 1 day old become infected with American foulbrood.

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NEWS LETTER

VOLUME VI 1961

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

NEWS LETTER

FOR OCTOBER 1939

Vol. VI, No. 12

(Not for publication)

December 1, 1939

FRUIT INSECT INVESTIGATIONS

Ethylene dichloride toxic to apple but safe on plum.--Oliver I. Snapp, of the Fort Valley, Ga., laboratory, reports that ethylene dichloride emulsion is toxic to apple trees. In recent tests the strength and dosage of ethylene dichloride (1/2 pint of 20-percent emulsion), used safely on peach trees, seriously injured 8- and 14-year-old apple trees. According to tests conducted this fall, ethylene dichloride emulsion is as safe on plum trees as on peach when used for the control of the peach borer, no injury having resulted from the use of 1/2 pint of 20- and 25-percent emulsions on 5-, 7-, and 9-year-old plum trees.

Survey of pear psylla in Washington.--In the News Letter for August 1939 (v. 6, No. 10, p. 2) mention was made of the finding of the pear psylla (*Psyllia pyricola* Foerst.) in the Pacific Northwest, and of plans for a cooperative survey. This survey, conducted jointly by the Washington Experiment Station, the State Department of Agriculture, and the Bureau of Entomology and Plant Quarantine, to determine whether the psylla exists elsewhere in the State than in Spokane County, has been completed. Eleven counties, containing 96.5 percent of the pear trees in the State, were surveyed, and 24,300 individual trees growing on 2,880 acres, were examined. No evidence of the psylla was found on any of these trees. In addition to this, packing-house workers were asked to bring in any pears coming to their notice which looked as though they might be injured by the psylla. A number of pears were brought in showing injury very similar to that resulting from the honeydew that the psylla produces. In each case the orchard from which the pears came was examined carefully and no evidence of psylla found. There was evidence that this type of injury can be caused by juice dripping from a wormy pear onto another pear hanging below it.

Colonization of milky disease of Japanese beetle larvae.--R. T. White and S. R. Dutky, of the Japanese beetle laboratory, Moorestown, N. J., have reported on the field colonization of the milky disease of Japanese beetle larvae in New Jersey. The work was carried on in cooperation with the Division of Japanese Beetle Control and the New Jersey State Department of Agriculture, and included distribution of the nematode *Neoplectana glaseri* and the type A milky disease organism. The milky disease organism was applied at the rate of 2 grams of the spore-talc mixture every 10 feet, by "spot" application, each gram of mixture containing 100 million type A spores. Approximately 1 acre was treated at each colony

site, averaging 1.75 pounds of the spore-talc mixture at each site. By the end of the fall treating season (October 18), the treatment had been applied at 161 points in New Jersey, in the counties of Mercer, Monmouth, Middlesex, Hunterdon, Somerset, and Union.

MEXICAN FRUITFLY CONTROL

Few fruitflies left in the valley.--Only two Anastrepha ludens Loew were trapped in the Rio Grande Valley in October. These came from the western end of the valley where the infestation was heaviest last year. Trap records indicate that few, if any, of last year's flies remain in the area to cause an early infestation this season. Harvesting of fruit for shipment began on October 2 but fruit from only a small number of groves would pass the State maturity requirements at that time. Shipments were below normal for the month; however, requests for harvesting permits were becoming more numerous before the end of the period. The absence of general fall rains is seriously retarding the development of the fruit crop.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Probable hibernacula of Bruchus brachialis Fahr. in western Oregon.--On November 2, Max M. Reher and L. P. Rockwood, Forest Grove, Oreg., reported that on April 20, 1939, it was observed that the first vetch weevils to appear in a field of hairy vetch that had been infested by weevils in 1938 near Wilsonville, Oreg., were concentrated under a lone oak tree on the east edge of the field. On October 13 an examination of the lower 10 to 12 feet of this oak was made. Under the moss on the trunk and main limbs, 2 B. brachialis, male and female (dead of fungous disease), were found. Under and among the lichens, mostly on dead limbs, 4 living B. brachialis, 2 males and 2 females, were collected and others were seen. Pea weevils (B. pisorum L.) but no vetch weevils were found in cracks of old telephone poles and in crevices of the bark of trees near this field. In all instances the weevils were completely quiescent until disturbed, even though the air temperature was 75° F. or above. Samples, about equal in bulk, of both the moss and the lichen were taken from the oak above referred to for later examination. In the collection of moss were found: 5 B. brachialis, 3 males (1 dead of fungous disease) and 2 females; 10 B. pisorum (4 dead). In the sample of lichen, which weighed 2 ounces and included a few small oak twigs, were found: 19 B. brachialis, 10 males and 9 females, all alive; 4 B. pisorum, all alive; and 1 Acanthoscelides pauperculus (Lec.), alive. The 2 dead B. brachialis males from the moss developed a luxuriant growth of Beauveria globulifera in a moist chamber and had doubtless been killed recently by this entomogenous fungus. The moss becomes saturated with moisture in rainy weather, whereas the lichen does not. Apparently the lichens on the oak trees are favorable hibernation places for B. brachialis in western Oregon, as Larson and Hinman found them to be for B. pisorum (Jour. Econ. Ent. v. 24, No. 5, p. 967, 1931) and other insects (Proc. Ent. Soc. Wash. v. 34, No. 3, pp. 43-44, 1932).

Field test of insecticides for control of European corn borer in sweet corn.--D. D. Questel, Toledo, Ohio, reports that the field program for the insecticidal control of the European corn borer in early market sweet corn at Toledo, Ohio, in 1939 was directed principally toward comparisons of (1) spray combinations of ground derris, synthetic and natural cryolite, and new preparations supplied through the Division of Insecticide Investigations; (2) dust combinations of cryolite with carriers of various types; and (3) dust preparations of nicotine, ground derris root, and synthetic cryolite. Four applications of the spray combinations were made at 5-day intervals, the material being applied by hand at 175-pounds pressure and at rates of from 120 to 150 gallons per acre, depending on the size of plants at time of application. Ground derris root and the cryolites were outstanding in the protection they afforded the plants, all spray combinations of these materials giving over 90-percent reduction in populations in both ears and plants, as compared with the number of borers in the checks. However, plant injury accompanied the cryolite applications. All new materials tested reduced borer populations significantly below those in the nontreated plats. Conclusive interpretations of the performance of the various dust treatments are not possible because of excessive rainfall during the hatching period of the borer which permitted only three applications of the dust. However, in the dust-carrier experiment, which utilized walnut-shell flour, gypsum, wheat flour, precipitated calcium carbonate (extra light, extra heavy, and medium weights), celite and Wyoming bentonite clay as carriers with synthetic cryolite, significant reductions in borer populations in the ears and plants were obtained and the trend of the data indicated that walnut-shell flour holds considerable promise as a satisfactory carrier. Ground derris, synthetic cryolite and dual fixed nicotine applied in dust combinations with Wyoming bentonite clay, three applications of 50 pounds per acre each at 5-day intervals and applied with a power duster using three nozzles per row, gave significant reductions in borer populations in both ears and plants, derris being somewhat more effective than the other materials. The various dust combinations, however, gave much less plant protection than did spray preparations containing the same active agents. Efforts to buffer the characteristic burning action of cryolite, when applied to sweet corn by the addition of magnesium oxide, soybean oil or meal, dried blood or calcium compounds, met with little success and no satisfactory method of eliminating this serious disadvantage of cryolite was found.

JAPANESE BEETLE CONTROL

Large acreage treated with lead arsenate.--During October 231 acres of soil was covered in soil-treating programs in 14 cities in 4 States. Soil treating in Chicago, begun on July 1, was concluded on October 19. Treatments in Indiana covered 14.7 acres in Fort Wayne, 18.4 acres in Logansport, and 13.3 acres in Whiting. One acre of soil was sprayed in Dearborn, Mich. Treating in Detroit, Mich., started on September 25 and continued through October and into November, with 31.8 acres covered during October. On October 7, 1.2 acres of soil was treated in Highland Park, Mich. The final treatment in Michigan during the month was made at Melvindale, where 2.6 acres was sprayed. Dearborn, Highland Park, and Melvindale are all suburbs of Detroit. In North Carolina, 12.6 acres was treated in Elizabeth City, 48.3 acres in Greensboro, 10.2 acres in Rocky Mount, 1.1 acres in Wilmington, 2 acres in Wilson, and 51.6 acres in Winston-Salem. Treatments in Wilson and Winston-Salem are being continued into November.

Methyl bromide fumigation demonstrations continue.--On October 3 the Division's portable 50 cubic foot methyl bromide fumigation chamber was demonstrated at a nursery at Towson, Md. Attending the demonstration were representatives from over 20 nursery and greenhouse establishments in Maryland and the District of Columbia. E. N. Cory and G. S. Langford, of the University of Maryland, and Maryland State Forester H. J. Howell, were also present. Plants fumigated consisted of evergreens, ferns, gardenias, begonias, snapdragons, peperomia, poinsettias, St. Paulia, pandanus, philodendron, and crassulas. Carmine begonias in 6-inch pots were injured, and the young growth on the tips of some of the ferns were slightly burned; otherwise, no damage was reported. A second demonstration in Maryland was made on October 4 at Hagerstown for the benefit of the growers in the western part of the State. This demonstration was also well attended and the results of the fumigation were successful. The methyl bromide fumigation chamber built by one of the large hydrangea growers in the Baltimore area was kept in almost constant use during October. Hydrangeas fumigated totaled 36,825 in pots ranging from 3 to 7 inches. All treatments to date have been successful. This 1,000 cubic foot chamber will hold 7,000 3-inch potted stock or 3,500 4-inch potted stock. Fumigation demonstrations were also staged during the month at 2 establishments on Long Island. The New Jersey district office is cooperating with the Division of Control Investigations in tests with methyl bromide as a fumigant against the European corn borer.

Certifications above normal in Long Island, N. Y., area.--Fall inspections have been numerous enough in the Long Island area to indicate an above-normal amount of business. One carload of nursery stock comprised of 85 various sizes of yew trees from a private estate was fumigated with carbon disulphide and then certified for shipment to the State of Michigan. Methyl bromide fumigation of 20,000 clumps of spirea was started at a nursery establishment. After fumigation the clumps will be set in sand over a treated and certified plot. As soon as the ground is frozen, the clumps will be removed and used to fill orders already on hand for the entire lot. Inspection was also started on 50,000 chrysanthemum roots and plants to be shipped by 2 establishments to Florida for further field productions of cut flowers in that State.

New Jersey nursery industry.--Orders for spring shipments from several of the New Jersey nursery establishments are reported as considerably in excess of last year. This has resulted in the supervision of cleaning of large quantities of stock preparatory to its heeling-in in certified lead-arsenate-treated plots. One South Jersey nursery shipped 2 carloads containing over 1,000 evergreens dug from lead-arsenate-treated plots.

Dual-purpose inspection.--Careful washing of roots of strawberry plants and their examination for the presence of red seal, a root disease, is simplifying Japanese beetle quarantine inspection of these plants for a large grower at Salisbury, Md. The grower has a special arrangement whereby nozzles from his sprayers have been adapted to the washing of the strawberry plants. Red seal disease caused heavy losses to the strawberry growers in the Salisbury area last year. By careful selection of soil and the elimination of infected plants, the growers claim that the disease can be eliminated within a few years.

Governors' roses inspected.--At the close of the New York World's Fair, gift packages of roses were shipped by one of the State exhibitors to

the Governor of each State. These were properly inspected and certified under the Japanese beetle quarantine regulations. Prior to closing of the fair on October 31, the manager of each State exhibit was visited by an inspector who furnished quarantine information and anticipated any irregularities that might result from the return of plant material to distant States.

District inspector confers with Canadian officials.--Late in October, H. B. Ward, district supervisor in charge of the Syracuse, N. Y., Japanese beetle district office, conferred with representatives of the Plant Inspection Service of the Canadian Department of Agriculture to discuss Japanese beetle quarantine regulations as they apply to plant material offered for entry into Canada.

Late beetle reports.--An inspector of the New York City area reported the collection of 150 beetles and the observation of hundreds of additional beetles at Bedford, Westchester County, N. Y., on October 10. The temperature was 80° F. and the beetles were as active as at any time during the summer. October 10 was also the latest date on which adults were observed in Connecticut, several specimens having been collected on that day in New Haven.

Results of municipal Japanese beetle trapping.--L. F. Prouty, of the Springfield, Mass., park department reported that 700,000 beetles were trapped in 1,650 traps operated last summer in that city. R. A. Sibley, of West Springfield, reported that 270 traps set in West Springfield caught a total of 136,732 beetles.

Hundreds of gypsy moth egg clusters removed.--Lumber, pulpwood, logs, crating, birch-bark novelties, contractor's equipment, balsam tips, and nursery stock were among the infested articles inspected in October. From 35 lots of infested material, 149 egg clusters were removed after creosoting. The most distant shipment in which infestation was found consisted of 3 cartons of birch novelties destined to East St. Louis, Ill. Three gypsy moth egg clusters were removed from these novelties. Forty-six egg masses were removed from 8 carloads of lumber bound for Camden, N. J. Inspection of a truckload of lumber at Danville Junction, Maine, prior to transportation to Morrisburg, Ontario, Canada, disclosed 3 egg clusters. Fourteen egg masses were taken from 2 carloads of lumber shipped to Suspension Bridge and Buffalo, N. Y. In addition to the egg clusters removed from articles just prior to their shipment, 737 egg clusters were found on 44 cords of grey birchwood inspected at Dixfield, Maine, for later use in the manufacture of candlestick and other Christmas novelties to be shipped to a chain of stores throughout the United States. Also, at Fryeburg, Maine, 14 egg masses were found on a quarter-cord of birch logs examined before they were made into novelties intended for distribution in noninfested States. Record shipments of lumber were reported from western Massachusetts, New Hampshire, and Maine.

Christmas tree cutting under way.--Cutting of Christmas trees began in central Vermont on October 10. The first trees to be certified this season consisted of 270 trees inspected and certified at Danville, Vt., for truck movement to Bethlehem, Pa. A large number of woodlots from which evergreen boughs will be collected for the Christmas trade were inspected in the

lightly infested sections of western Massachusetts and southern Vermont. Manufacturers of Christmas wreaths, roping, and decorative pieces were busy late in October gathering greenery, cones, red berries, and similar material and assembling them for inspection before manufacturing operations were started.

Temporary inspectors assist in gypsy moth inspections.--During October 11 temporary inspectors were added to the force in Connecticut and Massachusetts. Their principal assignment was the inspection of nursery stock going into winter storage. As some of the nurseries are infested with the Japanese beetle, as well as the gypsy moth, it was necessary to see that the stock was not only free from gypsy moth egg clusters but that the roots were also free from soil.

Crews shifted to elm-sanitation activities.--At the beginning of the October work period, W. P. A. personnel engaged in Dutch elm disease eradication work was reorganized for the fall elm-sanitation program. In Connecticut the personnel previously engaged in systematic scouting was changed to some form of sanitation work. A few New Jersey crews continued the tagging of elm trees likely to become infested with bark beetles, but most of the men were transferred to the removal of trees included in the sanitizing program. Crews employed by New York State continued scouting for beetle material. Eradication crews in New Jersey worked in almost every infected county in the State removing trees found infested with elm bark beetle carriers of the fungus, as well as destroying any residue of disease-infected trees still standing. Five of the W. P. A. crews working in New York were concentrated in the swamp area at Ancramdale, Columbia County, the northernmost infection center east of the Hudson River. Among the assignments of sanitation crews in Pennsylvania was the clear cutting of a disease center near New Hope, Bucks County.

Four autogiros grounded.--All aerial scouting operations in connection with the Dutch elm disease eradication program were discontinued for the season during the week ended October 21. Four ships were returned to the U. S. D. A. airport at Preakness, N. J., where they will be checked over in advance of major overhauling scheduled for the winter. On October 19 the services of a pilot and the Division's 160-hp. autogiro were lent to the Division of Plant Disease Control. The ship flew from Preakness to Ripley, N. Y., to engage in an aerial survey to map white pine areas in western New York in connection with control of the white pine blister rust. At the airport considerable floor space in the hangar was cleared and made available for dead storage of 50 trucks used in last summer's scouting operations.

First-record Dutch elm disease infection.--Confirmation was received during the month covering an elm in the town of Hamden, New Haven County, Conn. This infection is less than 1,000 feet from the site of the tree previously found infected in the town of North Haven. At this particular point the Hamden-New Haven town line is in the center of Mt. Carmel Avenue. The newly confirmed tree is across the street from the infected group of trees. When this infected tree was removed, two nearby elms were found infected with Scolytus multistriatus Marsham. Specimens of the bark beetles were collected and forwarded to the Bloomfield culture laboratory to determine whether they bore the disease fungus.

FOREST INSECT INVESTIGATIONS

Chemicals not effective as log sprays.--H. A. Bess, New Haven, Conn., reports that field tests were made during the past summer at Harvard Forest, Petersham, Mass., to determine whether certain chemical sprays would be effective against insects that cause damage to logs in dry storage. Thirty-three decks of approximately 50 logs each were used in the study, and over a dozen different sprays were applied by B. H. Wilford, of the Asheville, N. C., laboratory. Recently an examination was made of the logs and it was found that none of the sprays had proved to be effective, especially against bark beetles, which were abundant in all decks. Sawyers, however, were more numerous in the unsprayed check decks than in the sprayed ones.

Insects damage hurricane-felled timber.--H. R. Dodge, New Haven, says that during July, August, and a part of September considerable time was spent in examining hurricane-felled white pine in Massachusetts to determine the extent and nature of insect attack. Observations were confined principally to this tree species, because it constituted probably at least 90 percent of the merchantable timber blown down in this area. The examination was primarily of logs which had been purchased by the Northeastern Timber Salvage Administration of the United States Forest Service and held in dry sites preparatory to sawing. In the latter months, however, attention was given to logs in ponds, and the logged and unlogged blow-down areas in the woods. Insect conditions did not seem serious in July, and in lumber sawed prior to August 1 there was very little damage caused by Monochamus, ambrosia beetles, or blue stain. Late in August there was an appreciable increase of infestation by bark beetles and Monochamus, and at a few sites damage by the latter was commonly encountered in the sawed lumber. The heaviest infestation by ambrosia beetles noted in July was 1.42 percent of the logs at one site, and in August the percentage had increased to 5.71. Similar figures for Monochamus were 2.61 percent in July and 10.51 percent in August. It is probable that in the case of Monochamus many infested logs were overlooked in the July examination because the larvae were too small to push out borings. Buprestid larvae were not uncommon, but their damage was considered slight. There was evidence from observations on Monochamus that the insects in some cases had infested the logs in the woods prior to removal to dry sites, while in other cases they had infested the logs at the site by flight from adjacent woodlands. As would be expected, the larger the volume of logs the more sparse was the insect population. The Moulton field at West Concord was remarkably free of insects, and this was probably due to the fact that the logs were all removed from the woods during the dormant season, and the site was well removed from pine woodlands which might have served as centers of infestation. Floating logs were in good condition and free from stain, although in some logs bark beetles had successfully reproduced under the bark on the upper side. In the woods some of the wind-thrown trees, which had part of their roots in the soil, were still in good condition a year after the storm, but most timber of merchantable size had died from the effects of insect attack, sunscald, drought, or a combination of these factors. The insects attacking green trees were largely Ips calligraphus Germ. and Ips pini (Say), and these may be expected to kill some standing timber adjacent to wind-thrown areas and mills next year. Orthotomicus caelatus Eich. was the most common bark beetle found in the logs. Gnathotrichus materiarius Fitch and Xyleborus sp. were the ambrosia beetles most frequently encountered. Buprestid larvae were common but adults were

rarely seen, therefore it is concluded that they had passed the peak of adult activity before observations were begun.

Chemically killed elm trees resist insect attack.--R. R. Whitten, Morristown, N. J., reports that in June a large series of living elm trees were injected with solutions of sodium arsenite and ammonium bifluoride, using the rubber-collar method. The sodium arsenite was applied at the rate of 15 and 30 grams per inch of diameter (breast-high) and the ammonium bifluoride at the rate of 5, 10, and 15 grams per inch. One hundred trees between 6 and 20 inches in diameter were treated with each dosage at an average rate of 1.95 trees per man-hour of labor. Late in August all of the above trees were examined for sprouting. The results of this survey are presented in the following table.

Chemical	Dosage per inch	Trees sprouting		
		Total	Weak	Vigorous
		Grams	Percent	Percent
Sodium arsenite-----	30	30	18	12
Do-----	15	41	27	14
Ammonium bifluoride--	5	84	18	66
Do-----	10	79	36	43
Do-----	15	79	20	59

In October 25 trees from each dosage of each chemical applied were felled, debarked, and examined for bark-beetle attack. The results of these examinations are as follows.

Chemical	Dosage per inch	Trees		Total successful galleries ^{1/}
		Examined	Attacked	
		Number	Number	Number
Sodium arsenite-----	15	25	0	0
Do-----	30	25	0	0
Ammonium bifluoride--	5	25	3	168
Do-----	10	25	2	23
Do-----	15	25	0	0
Checks-----	(2)	3	3	6,971

^{1/} Scolytus multistriatus Marsham.

^{2/} The check trees were killed by a sodium chlorate injection which had previously been found to make the trees attractive to adults of S. multistriatus.

Notes on introduced ambrosia beetle breeding in elm wood.--According to C. H. Hoffman, Morristown, Xylosandrus germanus Bldfd. is an introduced oriental scolytid which has attracted some attention in connection with the Dutch elm disease. It has been collected in several localities in New Jersey and New York, also from Burlington, Ohio, and Huntington, W. Va. In New Jersey this ambrosia beetle has been bred from elm, oak, red maple, birch, and hickory. Adults have been observed to attack and usually breed

in several types of host material, such as recently felled, dead, and fire-scarred trees, chemically treated trees and logs, and wind-broken branches, as well as freshly cut and old logs and stumps. The heaviest infestations seen in the field have been in elm branches partially submerged in water and in the roots of old elm stumps located in moist situations. Irregularly formed brood burrows are made in the wood, both with and against the grain, and fungus growth associated with the adults causes the wood at these points and for several inches longitudinally to become stained with a blue or black discoloration. Although both males and females are found in the galleries, the males never leave them. The females overwinter in groups in the burrows. In New Jersey they form brood burrows in May. These measure up to 14 mm. in length and each lobe of the burrow is lined with a white fungus growth, or ambrosia. The eggs are laid loosely in different parts of the burrow and the resulting larvae feed on the ambrosia. Several weeks are required for egg deposition, therefore it is not uncommon to find all stages of this insect in the galleries from June to September. Under insectary conditions the life cycle of X. germanus is completed in 4 or 5 weeks.

Notes on life cycle of hemlock borer.--H. C. Secrest, Milwaukee, Wis., reports that life-history studies on caged hemlock borer material at the Menominee Indian Reservation show that the life cycle may be 1 or 2 years. Under favorable conditions larvae from eggs laid in June or early in July usually attain full growth in one season and hibernate in cells in the outer bark tissue. They pupate and the beetles emerge early the following summer, thus completing the life cycle in 1 year. On the other hand, under less favorable conditions the larvae may not complete development and move outward into the outer bark to pupate until early the next season; the adults emerge late in July and early in August. Larvae from eggs laid by these beetles overwinter as small larvae in their galleries in the inner phloem, attain full growth the next season, and hibernate in the bark, pupating and becoming adults the following spring. Thus larvae of all sizes may be found throughout the year.

Hemlock looper increasing in Wisconsin.--Mr. Secrest states that larvae of the hemlock looper were fairly abundant last summer on the Menominee Indian Reservation in Wisconsin, for the first time since 1926. The first moth was seen in the field on August 15, and the peak of the flight was during the first 2 weeks of September. The last moth observed in the field was seen on October 2.

Evidence of bark-beetle attacks hard to detect.--Donald De Leon, Fort Collins, Colo., reports that spotting of trees infested by the Black Hills beetle is much more difficult this fall than during the last few years. Most of the trees seem to be very heavily hit and very few, if any, visible pitch tubes are present. Consequently, the presence of boring dust around the base or in the bark crevices of infested trees is the only means of detecting them. Although the checking of every tree on the survey man's strip for the presence of boring dust has slowed up the survey crews' work this fall, the crews have already completed their work on most of the forests. The absence of many visible pitch tubes is probably due both to the drought of the past season and to the heavy attacks.

Low winter-temperature field study.--J. M. Whiteside, Portland, Oreg., states that the effect of low winter temperatures on the overwintering broods

of the western pine beetle (*Dendroctonus brevicornis* Lec.) is again being investigated by the Portland laboratory. Minimum air temperatures under actual forest conditions will be recorded during the next 2 or 3 winters on 70 regional pine-beetle survey plots selected at random throughout the ponderosa pine forests of eastern Washington and Oregon. In a general way temperature differences by life zones and infestation intensities will be sampled during this study. The trend and duration of the cold spells during the winter will be obtained from nearby standard Weather Bureau stations.

Bark-beetle survey completed.--F. P. Keen, Portland, reports that a cooperative bark-beetle survey of the ponderosa pine forests of eastern Oregon and Washington was brought to a close at the end of October. Extensive scouting work covered 11,000,000 acres of commercially valuable pine, while within this area 228 check plots totaling 88,950 acres were intensively cruised by 4 3-man survey crews. The survey showed declining infestation in eastern Washington and markedly increasing infestation in central and southern Oregon. As a result of the survey, beetle-control operations have been started on the Deschutes and Fremont National Forests, on the Warm Springs Indian Reservation, and on private lands in Oregon.

' GYPSY-MOTH AND BROWN-TAIL MOTH CONTROL

Falling of foliage provides excellent scouting conditions.--By the middle of the month several killing frosts had occurred and practically all deciduous trees, except the oaks, had dropped their foliage, and gypsy moth scouting conditions became excellent throughout the area. Although the fire hazards in woodlands were somewhat reduced, no burning was attempted at that time.

New egg clusters are larger than usual.--New gypsy moth egg clusters found in lightly infested territory since scouting was resumed this fiscal year are conspicuous because of their size. This appears to be true in the Pennsylvania area as well as in New England and in New York. It has been noticed, particularly in Massachusetts and Connecticut, that a large percentage of the new egg clusters are broken. This is a condition more commonly observed after winter has set in, when egg clusters are disturbed by the pecking of birds, by squirrels running over them, by ice and sleet tearing them from the tree trunks, or broken by other undetermined agencies. The breaking of the egg clusters reduces the effectiveness of treatment by creosote, as it is impossible to locate eggs scattered over the ground and from which caterpillars may emerge.

Forested areas in barrier zone steadily increasing in size.--From 10 to 15 years ago, maps were prepared by this Bureau of all townships included in the barrier zone. These maps outlined the woodland areas as they existed at that time, and they were an important aid in planning and performing gypsy moth work. Changes have since taken place as forest reproduction encroached on cleared land, changing the outline of the woodland sections and materially increasing their size.

Extreme care necessary by men doing gypsy moth ground work.--The need of exercising extreme care in examining all kinds of litter when doing gypsy moth ground work was recently demonstrated when an employee engaged in such work at one of the infestations in Connecticut picked up an old fence

rail and discovered a hidden hickory nut on which a gypsy moth egg cluster had been deposited. Egg clusters are sometimes found in nail boxes, under stones, and in many other odd locations.

Gypsy moth colony found near assembling cage which attracted male moth.--Scouting in the vicinity of one of the assembling cages where male gypsy moths were taken last summer in Brandon, Vt., disclosed the presence of a small infestation. Brandon is the most northern town in Rutland County and is just within the border of the barrier zone.

Wind spread responsible for infestations in Vermont barrier zone area.--The numerous and widely scattered gypsy moth infestations which have been located in several townships in eastern Addison County, Vt., since the resumption of scouting work this season, indicate conclusively that dispersion of small caterpillars by the wind is responsible for their presence in some unusual and remote places. As wind spread from large or strategically located infestations east of the barrier zone is one of the most important factors contributing to the annual reinfestation of the barrier zone, it is necessary to do considerable gypsy moth work east of the zone in order to provide as much protection as possible to the zone itself.

Work pushed in mountainous sections of Vermont and Massachusetts.--Gypsy moth scouts working in Warren Town, Washington County, Vt., and in the adjoining town of Granville, Addison County, made satisfactory progress during October. The towns are situated in the heart of the Green Mountains and are exceptionally rugged in contour, heavily forested, sparsely settled, and penetrated by few roads. The men scouted over ledgy and precipitous slopes where foot travel is very hazardous, even under the most favorable conditions. Every effort is being made to complete work in such localities before winter. In addition to scouting, ground work was started at a recently located infestation in Warren. It is also planned to reexamine the sites of several small infestations in Granville before snow interferes with this type of work, in order to discover any hidden egg clusters that may exist. For similar reasons, gypsy moth employees in Massachusetts were detailed to ground work at recently located infestations, particular attention first being given to infestations situated on high and exposed elevations. Windfalls and small deadwood are cut up and piled for later disposal by burning, and standing dead and defective trees are cut down so that future inspections can be made more easily. It is especially important that trash wood on the ground be gathered and piled at once, as early snows and freezing weather will interfere with this type of work later in the season.

Sawdust mill valuable in dry woodlands.--The sawdust mill developed by this activity for converting brush and waste wood into sawdust has been in continuous operation in the western section of Franklin County, Mass. Large amounts of combustible material had accumulated at sites of gypsy moth infestations where chopping crews were engaged in cleaning up dead and defective trees and in selective-thinning operations, and where for some time the tinder-dry conditions in the woodlands had prevented disposal of the debris by burning.

Hurricane-felled timber difficult to examine.--Although damage by the hurricane of September 1938 was comparatively light west of the Connecticut River in Massachusetts, one of the gypsy moth crews scouting in Cummington, Hampshire County, encountered an extensive tract of down timber. Many of

the uprooted trees were still alive and their dense foliage, together with the tangled mass of blow-downs, presented almost impenetrable thickets of tree tops, branches, and roots. The progress of the work in that region was considerably retarded, as such areas must be carefully inspected in order to discover all egg clusters and so prevent the wind spread of caterpillars into the barrier zone next summer. Cummington is located immediately outside of the barrier zone, and the mountainous character of the country presents ideal conditions for future wind spread into the barrier zone if the gypsy moth colonies are not exterminated.

Mountain-laurel thickets difficult to traverse.--A gypsy moth crew scouting in Woodbury, Conn., where a small gypsy moth colony was recently discovered; have been working in a tract of wild land densely overgrown with mountain-laurel. This shrub often grows in extremely compact thickets, very difficult to traverse, so that the progress of even the most experienced workers is greatly impeded. Woodbury is one of the southernmost towns in Litchfield County, and is within the borders of the barrier zone.

Small infestations found in the New York section of the barrier zone.--Scattered gypsy moth egg clusters were found by New York State forces in the eastern half of Berlin Town, Rensselaer County, N. Y., which is located immediately west of the Massachusetts State line. This necessitated some revision in the plans of work in several Massachusetts townships lying just to the east in Berkshire County. Gypsy moth infestations have seldom been found in these towns since the establishment of the barrier zone in 1924; but the fact that infestations, although they are small, were found to the west of the State line makes it imperative that the Massachusetts towns be carefully examined.

Scouting of Lackawanna and Susquehanna River banks completed.--The examination of the Lackawanna and Susquehanna River banks to high-water mark in parts of Lackawanna and Luzerne Counties, Pa., was completed during the last week in October. Only one gypsy moth infestation, located in Pittston Township, Luzerne County, was discovered during the progress of this important work.

Preliminary examinations of assembling cage sites.--In order to obtain preliminary information relative to the likelihood of infestation in the vicinity of assembling cages at which male gypsy moths were recovered during the past season in Pennsylvania, small crews of agents were detailed to make the initial surveys prior to the assignment of less experienced W. P. A. crews to scouting the areas. Negative results were obtained from the preliminary examinations in Kingston, Luzerne County; Penn Forest, Carbon County; and Tobyhanna, Monroe County. Infestations were located during this survey in the vicinity of cages which had attracted moths in Coolbaugh, Monroe County, and in Kidder, Carbon County, but most of these infestations are small and present no serious extermination problem.

Additional agencies contribute to gypsy moth work in Pennsylvania.--Elimination work against the gypsy moth, which has been conducted for several years by cooperation between the Federal Bureau of Entomology and Plant Quarantine and the Pennsylvania Bureau of Plant Industry, is now being supplemented by work from two other agencies. A State-sponsored gypsy moth project recently started in Pennsylvania is obtaining workers through the State Department of Public Assistance, but considerable difficulty has thus far been

experienced in supplying the full quota of men. On October 16, 50 men started operations on a gypsy moth project sponsored by the National Youth Administration in the townships of Plains, Jenkins, and Pittston, in Luzerne County. The work was well under way by the end of October, and most of the young men appeared to be taking much interest in the work and were evincing a desire to learn as much as possible. It is expected that similar work by the National Youth Administration will be started soon in Lackawanna County.

Gypsy moth truck damaged by deer.--A pick-up truck used in gypsy moth work was damaged in Pennsylvania when a buck deer suddenly leaped from a dense thicket at the side of a narrow road directly onto the hood of the truck. The impact dented one of the truck doors and broke the windshield. The driver did not lose control of the machine and no injury to the driver nor serious damage to the truck occurred. The deer was instantly killed in the accident.

C. C. C. gypsy moth work during October.--Gypsy moth work by the Civilian Conservation Corps was greatly reduced during the first part of October, only 468 6-hour man-days being used during the first week. This was increased to 924 6-hour man-days during the last week of the month. The decrease in work was caused by a major reduction in the number of men available for gypsy moth work, as an enrollment period ended the last of September. Considerable time was lost during the first part of the month, owing to the necessity of training the new men both in fire fighting and in the different types of gypsy moth control work in the field. A total of 2,765 6-hour man-days was used on gypsy moth work supervised by this Bureau east of the barrier zone during October, while 7,247 6-hour man-days were taken from gypsy moth work and used to reduce forest-fire hazards. From July 1 to the end of October, C. C. C. men scouted 5,597 acres of woodland, did selective-thinning work on 619 of those acres, and treated 29,876 new gypsy moth egg clusters.

Heavy infestations east of the barrier zone show reduction of gypsy moth population.--An examination of the Granby-Simsbury-Canton area in Connecticut, where C. C. C. gypsy moth work was concentrated last winter, followed by spraying in the spring, showed that excellent results had been obtained and that very few new egg clusters were present in the treated area. Limited examinations of woodland areas east of the barrier zone in Connecticut and Massachusetts indicate some reduction in gypsy moth egg deposition in towns where severe infestation has existed during the last few years. This was also true in an area examined in one town in the Connecticut River Valley in Vermont. However, there is scattered general infestation of large healthy egg clusters in these areas, and a great deal of work is necessary to prevent heavier infestations developing.

PLANT DISEASE CONTROL

Local outbreaks of stem rust in Minnesota.--Crop and weather conditions in Minnesota this year favored local epidemics of stem rust. During the season 25 cases of stem rust outbreaks near barberry bushes were observed and mapped. The following table indicates the host plants found rusted near infected barberry bushes.

Host	Spreads	Variety of stem rust
	Number	
Wheat-----	2	<i>Puccinia graminis tritici</i>
Oats-----	3	<i>Puccinia graminis avenae</i>
Barley-----	7	<i>Puccinia graminis secalis</i> or <i>tritici</i>
Rye-----	8	<i>Puccinia graminis secalis</i>
Timothy (<i>Phleum pratense</i>)-----	3	<i>Puccinia graminis phlei pratensis</i>
Quackgrass (<i>Agropyron repens</i>)----	10	<i>Puccinia graminis secalis</i>
Wild barley (<i>Hordeum jubatum</i>)----	5	<i>Puccinia graminis secalis</i> or <i>tritici</i>
Redtop (<i>Agrostis alba</i>)-----	3	<i>Puccinia graminis agrostidis</i>
Western wheatgrass (<i>Agropyron</i>		
smithii)-----	1	<i>Puccinia graminis secalis</i> or <i>tritici</i>

Stem rust on rye in Sherburne County was traced for 2½ miles from the barberry bushes that yielded the initial inoculum. Several sections were involved and a study of the area indicated that barberry bushes distributed throughout the county were responsible for local epidemics that eventually coalesced, causing general infection. The only ryefields infected with stem rust in Minnesota this year were found to be located near barberry bushes. In the early days of the barberry-eradication campaign, when barberry bushes were numerous and widespread, fields of rye were commonly damaged by stem rust. Since large numbers of barberries have been eradicated in Minnesota, heavily rusted fields of rye have been rare and have been found only in the vicinity of barberry bushes. The most heavily rusted field of wheat found in Minnesota this year was near Chaska, in Carver County. Infected barberry bushes were found on all 4 sides of it. This particular field was used by D. G. Fletcher, executive secretary of the Rust Prevention Association, as a demonstration of what happens when barberry bushes are permitted to grow near grainfields. The demonstration, held on July 6, was attended by about 25 prominent farmers and business men, some of whom were from the grain trade in Minneapolis.

Ten million barberry bushes destroyed in West Virginia since May.--
The following table indicates the progress that has been made in barberry eradication in West Virginia during the period May to October 1939.

County	Labor			Properties cleared	Bushes destroyed	Salt used
	Maximum Man- workers	Man- days	Area surveyed			
	Number	Number	Square miles	Number	Number	Tons
Berkeley ^{1/} -----	11	373	60.02	1	35	0.01
Greenbrier ^{1/} -----	75	4,037	18.14	14	885,426	25.80
Jefferson ^{1/} -----	11	510	122.11	1	70	.04
Monroe-----	88	4,133	5.88	42	6,718,074	256.18
Pocahontas ^{1/} -----	13	610	10.04	2	33	.24
Summers-----	24	144	1.80	16	2,283,842	64.87
Total-----	222	9,307	217.99	76	9,837,480	347.14

^{1/} Berberis vulgaris destroyed.

Since August 1935 some control work has been conducted in 10 different counties. Five of the southeastern counties situated in the foothills of the Allegheny Mountains comprise the major portion of the Berberis canadensis area. Farther north very little B. canadensis is found and the control problem is largely one of eliminating the common barberry (B. vulgaris), which has spread from ornamental plantings made some years ago.

Reinspection of known areas of infestation in Illinois.--According to R. W. Bills, in charge of barberry eradication in Illinois, areas infested with barberry bushes in Jo Daviess, Stephenson, La Salle, McHenry, Lake, and Du Page Counties, where initial control work was conducted in 1933, 1934, and 1935, have been reinspected this fall preliminary to carrying on clean-up work next year. In northern Illinois, reinspections are required at 5- to 6-year intervals in order to prevent seedling bushes from reaching the fruit-bearing stage. Clean-up work of a similar nature is now in progress in Rock Island and Marshall Counties. The general plan in Illinois is to keep a part of the field force on clean-up work in known areas of infestation while the remainder continues a survey of central and southern counties where bushes are far less numerous but where no complete survey has yet been made.

Blister rust field conference.--Twenty-five members of the Bureau and Forest Service technical staff in the western white pine region met on October 3, at Pierce, Idaho, to observe and discuss on the ground various blister rust control problems and practices. Beside those regularly engaged in control work, the group included Elers Koch, chief of timber management for region 1, and Ray Coster, supervisor, and Fred Neitzling, assistant supervisor of the Clearwater National Forest. The conference started with a half day of actual Ribes-eradication work to study production and efficiency on crew strips of various widths. In the 4 days' session consideration was given to practical modifications of Ribes-eradication methods, eradication tools, and checking methods. Plots established to study disease behavior on worked areas and the influences of sheep grazing on Ribes and pine regeneration and growth were inspected and discussed. A particularly interesting study of certain sheeping problems, which is being conducted jointly by the Clearwater Timber Protective Association and the University of Idaho on cut-over land, includes tight enclosures in which controlled grazing is performed. Through this study it will be possible to obtain data on the amount of damage to white pine seedlings from trampling, the browse value of common woods plants, and regeneration and growth of Ribes on sheepled areas.

Patent for "Herbicide" issued to H. R. Offord.--U. S. Letters Patent No. 2,173,235, dated September 19, 1939, and entitled "Herbicide," was issued to Harold R. Offord, in charge of the development of blister rust control methods, with headquarters at Berkeley, Calif., for "the free use of the people of the United States." Mr. Offord's invention relates to a new herbicidal formula for killing all manner of plants growing in promenades, alleys, public places, landing fields, along roads and railways, in forested areas, and specifically for the killing of currants, gooseberries, and barberry plants, where they occur in wild or cultivated state. The herbicide is composed of ammonium thiocyanate, furfural, and diesel oil, and is specifically designed for the eradication of plants

growing in soils that contain too high a percentage of moisture to allow rapid penetration and maximum absorption of diesel oil by the soil.

Improved Ribes-eradication tools increase efficiency in control work.--The development of Ribes-eradication tools in the Northwestern region has made a significant advance in the efficiency of control work. The improved tool used this season has worked out very satisfactorily. The Coeur d'Alene operation is experimenting with a Ribes hook which seems to be very satisfactory on rework areas where heavy pulling is not a factor. It is believed that the progress being made in connection with the improvement of Ribes tools will serve practically to eliminate the problem of broken-off crowns. Once this problem is overcome the amount of rework in subsequent years should be considerably reduced.

Many newly infected counties reported.--This fall a considerable number of newly infected counties have been reported in the Southern Appalachian and North Central regions. In the Southern Appalachian region, blister rust on Ribes was reported for the first time in Prince Georges County, Md., on Ribes americanum; in Kent County, Del., on cultivated red currants; in Preston County, W. Va., on R. rotundifolium; and in Albemarle County, Va., on R. rotundifolium. In Greene County, Va., rust was reported for the first time on white pine. Four pines were found to be infected with a total of 19 cankers. In the North Central region, blister rust on Ribes was found for the first time in Allamakee, Floyd, Howard, Mitchell, Tama, Worth, Delaware, Dickinson, and O'Brien Counties, Iowa, the infected host plant in all cases being R. nigrum. In Wisconsin infection was found for the first time on Ribes in Jefferson and Lafayette Counties. Both of these infections, which were on R. nigrum bushes, were extremely light, due perhaps to the very dry summer. Blister rust on Ribes now has been found in every county in Wisconsin. In Ohio, blister rust was reported for the first time on Ribes in Coshocton and Union Counties on R. americanum, in Erie and Huron Counties on R. cynosbati, and in Ottawa, Marion, Hardin, Logan, Van Wert, Champaign, and Richland Counties on R. nigrum. These new discoveries extend the known range of infection about 50 miles farther south in western Ohio. In the Sugar pine region, W. V. Benedict reports that all scouting activities terminated the middle of October and no advance in the southward spread of the rust was found this season. Scouting results bore out pre-season observations that weather conditions this year were not satisfactory for the long-distance spread of the rust.

New blister rust exhibit attracts attention at Eastern States Exposition.--The new blister rust exhibit, recently constructed by the Office of Exhibits of the Department, was displayed at the Eastern States Exposition this fall and attracted a great deal of attention. It is a three-wing panel type, made of knotty white pine with imitation white pine logs at the end of the wings. The central feature is a diorama showing a bulldozer in action, a crew uprooting Ribes, and scouts examining a diseased tree and Ribes. On the left of the diorama is a transparency showing the uredo and telial stages of the rust on Ribes leaves and on the right is a typical blister rust canker on white pine showing the aecial stage of the disease. One of the wings has a map showing the range of the white pines and blister rust and the other, a brief statement about the disease and its control. The total attendance at the exposition was about 284,000, and it is estimated that 75 percent of these people visited the Industrial Arts Building housing

the Government exhibits. As nearly as could be determined, more than half of these persons saw the blister rust exhibit. Keen interest was shown by the public and the attendant at the exhibit was busy from 10 a.m. until 10 at night.

COTTON INSECT INVESTIGATIONS

Relation of other hosts to aphids on cotton.--E. W. Dunnam and J. C. Clark, Stoneville, Miss., have been giving attention to the species of aphids found on cotton, the relation of other host plants to the species found on cotton, and parasitization of aphids. In an effort to determine whether the more general use of winter cover crops in the Mississippi Delta during recent years has a bearing on the infestations on cotton, collections of aphids were made during the spring of 1939 on the principal cover-crop plants used in this locality. On April 3, aphids were collected from hairy vetch, Austrian peas, and bur clover. All aphids collected on the three crops were determined as the pea aphid. Aphids were collected on May 12 from cotton seedlings in the 2-leaf stage located within 100 yards of the cover crops and within 200 yards of a peach orchard. All were found to be the cowpea aphid. An average of 7 aphids was found per 100 plants examined and none was parasitized. A collection made from this cotton on May 19, when it was in the 4-leaf stage, was a mixture of Aphis medicaginis Koch and the green peach aphid. An average of 38 aphids was found per 100 plants examined and 0.04 percent was parasitized. In another collection made on May 26 in this same cotton, when it was in the 5-leaf stage, there were present A. medicaginis, Myzus persicae Sulz., and the cotton aphid. A single winged form of Macrosiphum (Illinoia) pisi was also taken, but it is not certain that this species was feeding on the cotton. An average of 9 aphids was found on each 100 plants examined and none was parasitized. A collection made September 11, when the population was causing defoliation, were all determined as A. gossypii. A collection was made on May 10 on cotton planted early in another field located near a thickly wooded area more than half a mile from a peach orchard or any cover crops. The plants were in the 3-leaf stage and, when pains were taken to collect heavily infested plants, an average of 12 M. persicae per plant was found. No other species of aphids were collected in this field at the time. More than 14 percent were parasitized by the braconid Lysiphlebus testaceipes (Cress.). On May 23 a second collection was made in this field and an average of 14 aphids per plant was found, which were determined as A. gossypii. More than 45 percent of these aphids were parasitized by Lysiphlebus. A collection was made on June 20, when the plants were in the 4-leaf stage, in a third cottonfield planted June 2, or from 1 to 2 months later than normal. The 2 species collected were determined as M. persicae and the potato aphid. There was an average of 5 aphids per 100 plants and none were parasitized. In another collection made on June 22 from this field, all were determined as A. gossypii. It is thus seen that in the first field A. medicaginis was collected on May 12, 19, and 26; M. persicae, May 19 and 26; and A. gossypii, May 26 and September 11. In the second field M. persicae was collected on May 10 and A. gossypii on May 23. In the third field M. persicae was collected on June 20, Macrosiphum (Illinoia) solarifolii on June 20, and A. gossypii on June 22. These and other collections made later in the season indicate that several species of aphids migrate from other host plants and become abundant on cotton seedlings early in the season but eventually disappear and by the middle of the season we have an almost pure, if

not entirely pure, population of A. gossypii on cotton in the Delta section. The pea aphid, which was the only species collected on the cover crops, was not a factor in the early season infestations, only a single alate form being taken on cotton. P. W. Mason determined the aphids and C. F. W. Muesebeck the parasites.

Effect of calcium arsenate on aphid predators and parasites.--Observations made by C. T. Rainwater and F. T. Bibby at Florence, S. C., in cottonfields dusted with calcium arsenate for boll weevil control, showed a noticeable decrease in predacious coccinellids in the dusted plots. At the same time hundreds of Chrysopa eggs were observed but no larvae were seen. No reduction in the number of parasitized aphids was noted; on the contrary, they were more abundant as the aphid population increased. Two cage tests were conducted to obtain more definite information on the effect of calcium arsenate on the ladybeetles. A screen-wire cage was placed over each of two aphid-infested cotton plants, one of which had been dusted with calcium arsenate and the other untreated. Seventy adult Coccinellidae, mostly Hippodamia convergens Guer. but with a few Cycloneda sanguinea L. and Coleomegilla fuscilabris (Muls.), were released in each cage on August 7. Daily examinations were made on the number of dead beetles until August 22. Another similar test was begun on August 23 with 60 and 55 beetles, respectively, placed on the treated and untreated plants. In this test examinations were made only until August 26. The results of these 2 tests follow.

Test No.	: Live coccinellids:		Total coccinellids:		Coccinellids found	
	: released		: found dead		: alive at end of test	
	: Dusted		: Check		: Dusted	
	: Number		: Number		: Number	
1-----	: 70	: 70	: 55	: 9	: 0	: 23
2-----	: 60	: 55	: 29	: 3	: 28	: 43
Total----	: 130	: 125	: 84	: 12	: 28	: 66

It will be observed that the mortality of the beetles in the dusted cage in test 1 was much greater than in test 2. This may be due to several intermittent showers during the period of the second test, the first occurring within a few hours after the beetles were released, and to the shorter time examinations were made. However, these tests show that calcium arsenate dusted on cotton plants does kill the predacious coccinellids feeding on aphids and is apparently a factor in the increase in aphid infestation that frequently occurs following dusting with arsenicals.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Gin-trash inspection.--Gin-trash inspection is begun each crop season with the harvesting of the cotton crop to determine the degree of infestation in regulated areas and to locate possible infestations in nonregulated areas. Inspections of gin trash in Alabama, Georgia, Mississippi, Florida, and Louisiana were negative for the 1939 season. The pink bollworm was found for the first time in Mitchell County, Tex., in October 1939, when one specimen was taken in the examination of a large quantity of gin trash in that county. Additional pink bollworm specimens were found in gin trash in Concho and Tom Green Counties in October, following the initial finding of pink bollworms in those counties in September. Inspection of gin trash

in the regulated areas in October resulted in negative findings in Arizona. The Pecos Valley of New Mexico, which has been infested for many years, was found to have in general a lighter infestation in 1939 than during the previous year, although a heavy localized infestation was found in one field in Eddy County, N. Mex.

Field clean-up in south Texas and the lower Rio Grande Valley of Mexico.--Field clean-up was brought into practice for the first time in the lower Rio Grande Valley of Texas in the 1937 cotton crop, following the finding of pink bollworm infestation in the 1936 cotton crop, in Cameron and Starr Counties and in the Matamoros area in adjacent Mexico, and has been carried out each following year in south Texas counties as one of the principal control measures in the fight to eradicate the pink bollworm from that region. Field clean-up in this area, as practiced by the farmers under State regulations, had not proved adequate as a suppressive measure; consequently, in order to increase the efficiency of the clean-up program, and to bring some financial relief to the local growers, funds were appropriated by Congress so that the Federal Government bore in part the cost of clean-up during the 1939 season. This resulted in a more thorough and satisfactory clean-up than had been obtained heretofore. Cooperation on the part of the farmers in this area during the 1939 clean-up continued entirely satisfactory in the main; however, the payments made by the Department did not cover the entire cost of the clean-up, and in some instances growers failed to destroy the cotton stalks and were not in line for payment. As a matter of fact, some cotton stalks were still standing on October 1, at which time it became mandatory under State regulations to have the fields free of growing cotton. The State filed charges against several persons in this connection. The appropriation of funds for clean-up in south Texas made it possible for the Department to undertake the elimination of all soca or abandoned cotton in the lower Rio Grande Valley. It is believed this will result in the removal of one of the means by which the pink bollworm has been carrying over in considerable numbers. Essentially the same program was undertaken in the Coastal Bend counties as that in the valley. Owing to a slight difference in the maturity of the crop and the growing season, the State requires that all growing cotton be removed from fields in that area by October 15. There were very few aggravated cases of non-compliance with respect to the State order on that date, and no charges were filed against growers in that region. Soca or abandoned cotton does not offer any considerable problem in the Coastal Bend. In addition to the work performed on the American side, there was a very active stalk-destruction program in the lower Rio Grande Valley of Mexico. The Bureau cooperates with the Mexican Department of Agriculture in the assignment of inspectors with cars to work with inspectors of the Mexican department. Regulations requiring the destruction of plants by the owners at their own expense are in effect on the Mexican side.

Okra infestation in the lower Rio Grande Valley.--One of the principal activities in the lower Rio Grande Valley district during October was in connection with okra, following the amendment of the pink bollworm quarantine in September to add okra to the list of articles requiring certification for movement outside regulated areas. This action was taken as a result of the discovery of light pink bollworm infestation in okra pods in August. During October, 26 additional okra fields were found to be infested, making a total of 34 infested fields at the close of October 31. Since the

beginning of okra inspections in September, approximately 91 okra plantings have either been destroyed by plowing and burning the stalks and pods or have been cut back so as to retard the fruiting period. Most of these plantings, having no commercial value, were completely destroyed. Of the 91 plantings plowed out, 57 were not known to be infested; they were, however, contiguous to infested fields (either okra or cotton) and the owners voluntarily destroyed them without inspections being made. Effective October 28, State Quarantine Proclamations 67-J, amended, and 67-L were released by the Commissioner of Agriculture. These proclamations permit shipments from fields under certain safeguards outlined therein. Growers have expressed their willingness to cooperate in every respect with the authorities in controlling the pink bollworm menace. Dealer-carrier permits for the movement of okra were put into effect in October.

Field clean-up in the Big Bend.--In October a decision was reached by agricultural officials of both the United States and Mexico to again institute control measures for the 1939-40 crop season in the Big Bend area of Texas and Mexico, similar to the program brought to a close with the maturity of the 1939 cotton crop. This decision was made following the very successful outcome of the 2-year cooperative plan for the 1938-39 season in the Presidio-Ojinaga section, which was carried on in an effort to suppress the very heavy pink bollworm infestation in that region. Such action was believed expedient in order to hold the remarkable advantage gained over this insect, and perhaps bring about even a greater reduction of infestation for the 1940 crop season. Field clean-up in the Big Bend area of Texas is being carried on with Federal funds this season, as was the case under the 2-year plan. However, farmers are cooperating to the best of their ability in getting their cotton picked out early in order that fields may be available for cleaning. Stalk-destruction work in the Presidio area was begun the first part of the last week in October, and at the end of the month approximately 400 acres of stalks had been cut. Some of the most important acreage, with reference to infestation, was cut during this period and prior to the heavy frost which occurred on October 31. This accomplishment was of great advantage to the program, inasmuch as considerable shattering of material occurs during stalk-cutting operations after frost. Field clean-up in Ojinaga, Mexico, was also getting under way at the end of the period.

Wild-cotton eradication in southern Florida.--An effort was begun a number of years ago to eradicate wild cotton from southern Florida, following the discovery that this plant was heavily infested with the pink bollworm. Wild cotton in this area bears fruit throughout the year, and thus serves as a continuous host to the pink bollworm, from which this menace was spreading to domestic cotton plantings in the Southeastern States. On October 1, 36 W. P. A. employees and 1 Bureau inspector were engaged in this work on Key Largo and the Matecumbes. During the first week of the month crews were started at Key West, Bonita Springs, Fort Myers, Punta Gorda, Bradenton, Tampa, and St. Petersburg. By the end of the period there were 11 crews in the field employing a total of 82 laborers and 9 foremen. In addition to the known wild cotton acreage, 1,569 acres was scouted for plants, with negative results. Efforts in regard to the establishment of a C. C. C. camp at Cape Sable, to aid in wild-cotton-eradication work, were continued during October. The erection of this camp has been interfered with to a considerable extent by unfavorable weather.

Thurberia-plant eradication.--The eradication of *Thurberia* plants was continued throughout the Tortillita Mountains of southern Arizona during October. An effort has been under way since 1935 to destroy these plants from areas adjacent to domestic cotton plantings, because they are infested with a weevil which is destructive to cultivated cotton, and to which it was spreading from infested mountain ranges. This work made good progress during October. A total of 8,800 acres was covered and many *Thurberia* plants were destroyed. Practically all fruiting plants showed *Thurberia* weevil infestation.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Suspected plant bugs not responsible for "pinworm" injury to tomatoes.--Special studies were performed in the Charleston, S. C., area by C. O. Bare, during which a series of adults of the southern green stinkbug, the leaf-footed bug, the tarnished plant bug, an undetermined species of a leaf-footed bug, an undetermined plant bug, and larvae of the tomato fruitworm (*Heliothis armigera* (Hbn.)) were confined in cages with tomato plants and observations were made on the resulting damage to the fruits by each of the species involved. It was indicated that the so-called "pinworm" type of injury to tomato fruits of which the growers complain frequently was not caused by any of the species of plant bugs included in these tests. The injury is possibly caused by small larvae of *H. armigera* or by other lepidopterous larvae.

Methods for reducing tobacco moth in growers' pack houses.--Experiments in North Carolina by J. P. Vincent and H. N. Pollard, of the Richmond, Va., laboratory, against *Ephestia elutella* (Hbn.) in growers' pack houses indicated that the covering of tobacco "bunks" with tobacco cloth during the period when the adults of *E. elutella* were in flight, supplemented by weekly applications of pyrethrum powder directed against the adults, served to reduce greatly the infestation in the stored tobacco. In the course of these experiments certain of the tobacco bunks were covered with plant-bed cloth in each of 6 pack houses. The cloth served as an egg trap upon which the moths laid their eggs. This cloth was removed at frequent intervals during July, August, and September and immersed in boiling water for the purpose of killing the tobacco moth eggs deposited thereon. Three of the pack houses were dusted each week with pyrethrum powder, at a dosage of approximately 3 ounces per 1,000 cubic feet of space. An examination of the stored tobacco in covered and uncovered bunks at the time of the grading for market disclosed a pronounced reduction in the number of tobacco moth larvae and injured leaves in the covered, as compared to the uncovered, bunks. A detailed examination of 30 sample sticks (a stick consists of about 60 to 90 leaves of tobacco) from the uncovered bulk in 1 pack house revealed an average of 63.0 larvae per stick, as compared with 1.7 larvae per stick in the covered bulk, comprising a reduction of 97.3 percent. There was also a reduction of 82.5 percent in the number of injured leaves in the covered bulk, as compared to the uncovered. Similar examinations in 2 other pack houses disclosed reductions of 73.1 and 83.7 percent, respectively, in the covered bunks, as contrasted to the unprotected tobacco.

Sulfonation of certain vegetable oils reduces injurious effects on plants.--In tests designed to determine the foliar tolerance of squash, melon, cucumbers, cabbages, collards, and kale, to cube sprays, each containing one of three natural vegetable oils, or of three sulfonated vegetable oils,

R. A. Fulton, of the Columbus, Ohio, laboratory, determined that no foliage injury occurred on melons, cucumbers, or four varieties of squash when sprays containing the natural or sulfonated vegetable oils were applied. On cabbage, collard, and kale the natural oils (with the exception of grapefruit-seed oil) destroyed most of the typical sheen of the leaves and caused the plants to assume a yellow-green appearance. The sulfonated oils of peanut, soybean, and grapefruit seed affected the sheen to a lesser degree. Sulfonated grapefruit-seed oil on cabbage and collard removed only an estimated 10 and 5 percent, respectively, of the natural sheen, whereas a slight yellowing was produced on kale by the application of sprays containing this oil. In general, it was found that the sulfonation of the oils of soybean, peanut, and grapefruit seed caused less injury on cruciferous plants than did the natural oils, but all of them affected the natural blue sheen. The sulfonated grapefruit-seed oil caused less injury than did soybean or peanut oil. No injury occurred to any of the cucurbits involved in the experiment when treated with a spray containing 1 percent of oil in water and cube containing 0.02 percent of rotenone. Incidentally, it was observed that the physical properties of sulfonated soybean and peanut oils were such as to enhance the suspension of cube particles in the spray, as compared to sprays not containing these oils.

Important results obtained in insecticide tests against raspberry fruitworm.--In summarizing the results of insecticide tests against Byturus unicolor Say during 1939, B. J. Landis, W. W. Baker, and associates at the Puyallup, Wash., laboratory, report that examinations of samples of loganberries harvested from plots dusted with a cube dust mixture on Vashon Island showed (1) that a dust mixture containing 0.50 percent of rotenone was superior to a dust mixture containing 0.25 percent of rotenone; (2) that the addition of a wetter and spreader to the dust mixture slightly improved the degree of control attained; (3) that there appeared to be little difference in the ultimate control achieved between plots treated with a dust mixture on the basis of a 7-12-12 and a 12-12-12 day schedule, respectively, beginning with the appearance of the first blooms; (4) that the cleanest berries were harvested during the third and fourth weeks of picking; and (5) that applications of rotenone-dust mixtures, which gave good control in the Puyallup district during 1937 and 1938, did not give satisfactory results in fields treated for the first time if the B. unicolor population was at a high level. Examination of samples of raspberries demonstrated that very good control was obtained following three applications of a dust mixture containing 0.5 percent of rotenone or a spray containing 0.01 percent of rotenone, with or without a wetter and spreader, when such dust mixtures or sprays were applied according to a 7-10-10 or a 10-10-10 day schedule, respectively, beginning with the appearance of the first blooms. Examination of samples of various berries located in 14 fields treated or untreated by growers in accordance with commercial practice showed (1) that 2 applications of a dust mixture containing 0.5 percent of rotenone gave good control when applied at the proper time; (2) that 1 application of this dust mixture did not provide adequate protection from B. unicolor during the entire period of commercial picking; (3) that fields not treated with dust mixtures or sprays containing rotenone during 1939 were rather heavily infested by B. unicolor, even though this pest had been held in subjection during preceding years by applications of either of the designated insecticidal treatments.

Fall populations of beet leafhopper low in southwestern Idaho.--Surveys made by J. R. Douglass and his associates of the Twin Falls, Idaho, laboratory during the period July to September indicate that the low populations of the leafhopper during the spring, supplemented by unfavorable conditions of host plants during the summer, have resulted in the lowest fall population of the beet leafhopper recorded in the past 6 years in southwestern Idaho. The survey disclosed that there were approximately 425,000 acres of Russian-thistle (Salsola pestifer A. Nels.) in this area during 1939, as compared with an average of approximately 473,000 acres of this plant during the preceding 6 years. Premature drying of Russian-thistle actuated by dense stands which crowded this plant, or mixtures of Russian-thistle with downy chess or other spring annuals, together with deficient moisture, resulted in the decimation of the stand of this host plant.

Status of various insect pests determined on shade-grown and sun-grown tobacco.--In a survey of insect damage on shade-grown and sun-grown tobacco, performed by F. S. Chamberlin, A. H. Madden, and L. L. May of the Quincy, Fla., laboratory, it was found that in 15 fields of shade-grown cigar-wrapper tobacco in the Quincy area the percentage of damage caused by the tobacco hornworms (Protoparce quinquenaculata (Haw.) and P. sexta (Johan.)), the tobacco flea beetle (Epitrix parvula (F.)), and the tobacco budworm (Heliothis virescens (F.)) was 0.1, 0.5, and 0.1, respectively, on the basis of the local grading system for cigar-wrapper tobacco, which is based on the degree of soundness of the leaf surface. In a similar survey of fields of sun-grown tobacco of the cigar-filler and cigarette types it was found that the average damage sustained by the feeding of hornworms and the tobacco budworm was 1.6 and 1.0 percent, respectively, on the basis of loss in weight.

Shipments of European earwig parasites.--C. W. Getzendaner and R. S. Wright, of the Puyallup laboratory, report that during the past summer a total of 2,335 adults of Bigonicheta setipennis Fall., an imported parasite of the European earwig (Forficula auricularia L.), were shipped for colonization to Massachusetts, Rhode Island, Utah, and Washington, and that the mortality en route of these parasites averaged approximately 10.8 percent.

INSECTS AFFECTING MAN AND ANIMALS

Nicotine as a mosquito larvicide.--H. E. Stage, of the Portland, Oreg., laboratory, reports that in preliminary tests Blackleaf 155, applied either as a dust or as a nicotine-bentonite-soybean-oil emulsion, failed to produce better than an 80-percent kill in laboratory tests against larvae of Culex and Theobaldia when applied at the rate of 4 pounds of actual nicotine per acre. This amount of nicotine would require 84 pounds of nicotine dust per acre, as the Blackleaf 155 dust contains approximately 4.75 percent of nicotine. The cost of application at this rate would be prohibitive. In these tests it was noted that the nicotine seemed to have a paralyzing effect, as larvae that appeared dead later became active. Large larvae appeared to be killed more easily and quickly than were second- or third-instar larvae.

Comparative toxicity of larvicides to mosquito larvae.--Twelve different preparations representing seven different poisons were tested in the laboratory against third- and fourth-instar larvae of four different genera of mosquitoes. The poisons tested included diesel oil, cashew-nut oil, pyrethrum, phenothiazine, 1-phenol benothiazole, paris green dust, and nicotine-bentonite. Diesel oil and cashew-nut oil combinations appeared to be equally

effective against all four genera and gave good kills. Phenothiazine preparations varied in their killing power. Culex and Anopheles appeared to be more susceptible to this poison than were Aedes or Theobaldia. The benothiazole at the strength used gave poor kills against the three genera tested. Culex showed the greatest resistance to floatable paris green dust and Anopheles were the easiest to kill. Anopheles showed a surprisingly strong resistance to pyrethrum. Nicotine gave poorest kills against Theobaldia. A general summary of all the poisons tested against the three genera of pest mosquitoes showed that the Aedes genera were the least resistant, the Culex next, and that Theobaldia were the most resistant. In an additional series of tests, in which the effect of pyrethrum on the larvae of Culex and Anopheles was further compared, it was found that an average of 96 percent of the Culex larvae were killed in 24 hours and only 60 percent of the Anopheles larvae. In 48 hours the average percentage of kill changed to 99 percent for Culex and 87 percent for Anopheles.

Phenothiazine as a larvicide in emulsified form.--Five grams of phenothiazine dissolved in 5 cc. of acetone and 20 cc. of penetrol is the formula commonly used in applying this poison as a mosquito larvicide. Field tests have shown that less than 3 gallons per acre would be needed to get a kill of 95 to 98 percent with this mixture. For hand application with a knapsack sprayer more volume is needed to get good coverage. From 15 to 25 gallons should be applied, depending on the amount of vegetation and debris. To provide this volume, phenothiazine emulsions were prepared using several different emulsifiers, including methyl ethyl ketone and soap, glycerine and alcohol, dichloro ethyl ether and triethanolamine, methyl isobutyl ketone, methyl amyl ketone, and triethanolamine, acetone, pine oil and triethanolamine, methyl isobutyl ketone, and Dupont's Avirol. Emulsions were also made from isobutyl ketone, diesel oil, and triethanolamine, also from methyl isobutyl ketone and triethanolamine. These emulsions were tested on Culex larvae and compared to checks treated with 0.5 part per million of King's formula (5 grams of phenothiazine in 5 cc. of acetone and 20 cc. of penetrol). These checks gave a mortality of 89 percent and the methyl amyl ketone emulsion gave 84 percent mortality. The rest of the emulsions ranged downward in effectiveness to as low as 20 percent kill with the dichloro ethyl ether preparation. The best of these emulsions have excellent physical properties, are stable, and can be diluted with water in any proportion. Since good kills can be obtained, the emulsified phenothiazine becomes a practical larvicide which will insure adequate coverage of the water surface.

Toxicity of mosquito larvicides to other aquatic animal life.--Various larvicides were tested on free-swimming organisms, as time permitted and material was available last season. Pyrethrum emulsion, diesel oil, cashew-nut oil and diesel-oil mixtures, paris green dust, nicotine emulsions, phenothiazine emulsions, and phenothiazine dissolved in acetone-penetrol mixtures were the larvicides used. Data were obtained on the effect of these larvicides on members of the classes Crustacea and Insecta and on the order Anura of the Class Amphibia. Two species of fish were also tested. Although the work was limited in scope and incomplete, the following conclusions can be drawn: In general, larvicides that are toxic to mosquito larvae will be toxic in nearly the same degree to most aquatic insects. Adults that spend

most of their time on or near the surface of the water are very quickly killed by larvicides. Organisms that spend most of their time in the lower or bottom strata are not easily killed by surface larvicides. Dragonfly nymphs are more resistant to various larvicides than are damselfly nymphs. Pyrethrum emulsions at both 25 and 35 gallons per acre were not toxic to amphibians or fish. Diesel oil applied at the rate of 25 gallons per acre was partially toxic. Liquid preparations containing cashew-nut oil were very toxic to nearly all aquatic life.

Experiments with poisoned baits for control of fire ants.--B. V. Travis reports that final observations for the present year were made in October on the experiments with poisoned baits for the control of fire ants at Forshala Plantation, Fla. The data have not been completely analyzed but it appears that thallium acetate was more effective against fire ants than was thallium sulfate. The results indicated that the bait was more effective when applied in a bait can, although satisfactory results were also obtained with the acetate baits in sawdust applications. Good results were obtained with the sulfate bait when applied in the spring, but not when used in the fall. The lower concentrations of thallium acetate baits were more effective when used in the spring, whereas the higher concentrations seemed to be slightly better in the fall. The most noticeable feature of the poisoned-bait tests is that there was no increase in the number of colonies in the area treated, such as has been noted in soil-fumigation experiments.

FOREIGN PARASITE INTRODUCTION

Beauveria bassiana as a natural control for codling moth larvae.--In studying the natural control factors operating against the codling moth it was noticed that the mortality of first- and second-instar larvae appeared to be unusually high in orchards near Kearneysville, W. Va., in 1939. The season was unusually rainy. In the first-brood infestation counts made by E. Gould in the biological orchard there were 1.83 worm entrances to each sting. In 1938, a much drier season, the same trees showed 4.88 worm entrances to each sting. Six of 10 dead larvae removed from stung apples produced mycelial growth of a fungus, Beauveria sp., probably bassiana. A small experiment was conducted by P. E. Marucci on July 3, in which spores of the fungus were sprayed and dusted on stung and clean apples on which 2 freshly laid codling moth eggs were placed. Each apple was placed in a jelly jar and left undisturbed until August 27. The results are given in the following table.

	:	:	:	:	Mature	:	:	:	Dead larvae	:
Treatment	:	Eggs	:	Apples	:	larvae in	:	:	Before	:Showing:
(20 apples)	:	hatched:	:	scored	:	cocoons	:	Moths:	maturity:	white :Larvae
	:	:	:	Stings:	:	Worms:	:	Dead:	Alive:	:
	:	:	:	:	:	:	:	:	:	powdery: dead
	:	:	:	:	:	:	:	:	:	growth:
	:	No.	:	No.	:	No.	:	No.	:	No.
	:	No.	:	No.	:	No.	:	No.	:	Percent
Wormy--sprayed--:	:	--	:	--	:	20	:	2	:	2
Wormy--dusted---:	:	--	:	--	:	20	:	3	:	1
Wormy--check----:	:	--	:	--	:	20	:	--	:	8
Clean--sprayed--:	:	29	:	29	:	3	:	1	:	1
Clean--dusted---:	:	26	:	25	:	2	:	--	:	--
Clean--check----:	:	27	:	31	:	19	:	--	:	13
	:		:		:		:	2	:	2
	:		:		:		:	12	:	--
	:		:		:		:		:	44.4

The results of this small-scale experiment indicate that the fungus is capable of infesting larvae already established in an apple and that it prevents a large percentage of first-instar larvae from making successful entries into apples sprayed or dusted with the spores.

Predaceous thrips on codling moth eggs.--In studying the effect of artificial control practices on natural enemies of insect pests, H. A. Jaynes and P. E. Marucci report finding a large number of black thrips (Leptothrips mali (Fitch)) occurring in the two apple orchards under observation near Kerneysville, W. Va. This thrips has been reported as predaceous on other thrips, mites, and aphids. It was abundant in daisy flowers, as well as on the apple foliage. Both nymphs and adults were observed feeding on codling moth eggs in the orchard. The thrips also fed on codling moth eggs in confinement, but it was difficult to keep it alive for any length of time. This species is very active and moves rapidly over the foliage when disturbed. While feeding on an egg, however, it can be jarred or shaken considerably without being dislodged. Adult thrips in confinement were given codling moth eggs 1, 3, 4, and 5 days old and some eggs of each age were attacked. Some of the eggs were in a very late stage of development when fed upon. Counts of the thrips in the two orchards showed that the lead arsenate sprays applied on June 10 and June 15 in the commercial orchard decreased both the nymphal and adult populations, whereas in the biological-control orchard, which received no sprays, a rather sharp increase in population was taking place. From June 6 to 18 the average number of thrips occurring on apple foliage in the biological orchard was 258 per 2-hour count. The predatism of eggs placed in the orchard during this period was 16.4 percent. During the same period in the commercial orchard the average number of thrips was 66 and predatism was 6.21 percent.

FOREIGN PLANT QUARANTINES

Pods of Inga sp. infested with Anastrepha distincta.--On October 24, during the customary baggage inspection on Pullman cars crossing the line from Mexico at Nogales, Ariz., a passenger requested permission to take what he called some "bean pods" found in his baggage, through to Canada. He stated that they were intended for a friend of his, a Mexican consul in Victoria, British Columbia. The inspector explained that this material, which proved to be pods of Inga sp., was not enterable and therefore could not be retained by him. Inspection of the Inga pods revealed them to be

heavily infested with larvae of A. distincta Greene, 157 larvae being taken from 20 pods. One lepidopterous larva, identified as Stonoma sp., was also found in this material.

Infested fruit found on special train from Mexico.--On October 15 a special Pullman train of 11 cars, returning to San Francisco after a visit to Mexico City, arrived in Nogales, Ariz. Occupants of the train assured the plant quarantine inspectors that they knew the danger involved in bringing in foreign fruits and that there were no prohibited fruits on the train. Inspection, however, revealed a Mexican shopping bag, stuck away in a corner of the baggage car and which contained 150 tejocotes, 40 sweet limes, 20 apples, and 20 guavas. No one claimed ownership of this fruit. Examination disclosed the presence of 27 larvae of Anastrepha ludens Loew in the sweet limes and 74 larvae and 23 pupae of Rhagoletis pomonella Walsh in the tejocotes. Specimens of Aspidiotus camelliae Sign. were also present on the tejocotes.

Rare ant found on plant from Mexico.--On July 4 a plant in soil was intercepted at the footbridge in El Paso. Three living ants were taken from this plant and they have been identified as Cerapachys (Parasyscia) augustae Wheeler. According to M. R. Smith, of the Division of Insect Identification, this species is one of our rarest North American ants. No specimens are present in the United States National Museum and, so far as is known, this is the second time the species has ever been collected.

Pink bollworm in okra from Mexico.--On October 12 two larvae of the pink bollworm (Pectinophora gossypiella Saund.) were intercepted at Brownsville in okra from Mexico. The interesting point about this interception is that both larvae were taken from edible okra, that is, from okra which was young and tender. It is also interesting to note that, although only 11 okra pods were intercepted, 2 of them were infested.

Inaugural round-trip flight of "California Clipper."--On September 5 the California Clipper, one of the new 42-ton planes of the Pan American Airways, completed the inaugural round-trip flight from San Francisco to Auckland, New Zealand, via Honolulu, establishing a route over which will be maintained a regular commercial schedule in the near future. This extension of trans-Pacific air lanes brings Australia, New Zealand, and a new area of the South Seas within days of the coast, instead of weeks, thus increasing the possibility of transporting pests on agricultural commodities. The cooperation of the Pan American Lines in maintaining all possible safeguards against such introductions is assured. The initial return flight carried 12 express shipments of Hawaiian plant material consigned to points in California.

Entomological interceptions of interest.--Living specimens of the fruitfly Anastrepha mombipraeoptans Sein were collected on August 10, 1938, in Malay apple in the field at Bayamon, P. R. A living adult of the cerambycid Leptostylus testaceus (Froel.) was taken at Boston on July 3 in a yam in baggage from Trinidad. A living specimen of the lygaeid Cryphula affinis (Dist.) was found at Washington, D. C., on April 26 with orchids (Cattleya) in express from Colombia. An adult of the weevil Apion pomonae F. was intercepted at Chicago, Ill., on April 5, 1938, in a vetch pod in in cargo from Germany. A living specimen of the European earwig (Forficula

auricularia L.) was taken at Philadelphia on May 22 in a cabbage stalk in ship's stores from Spain. A living adult of the scolytid Xyleborus propinquus Eichh. was found at Laredo, Tex., on May 23 on a pineapple in cargo from Mexico. Living specimens of Kakothrips robustus (Uz.) were intercepted at New York on July 3 on pea pods in ship's stores from Italy. Adults of the weevil Diocalandra stigmaticollis (Gyll.) arrived at Honolulu, T. H., on May 16, 1938, in a coconut in cargo from the Philippines. Specimens of the scale insect Aonidiella comperei McKenzie were intercepted at San Francisco on February 28 on the cap or stem end of a coconut in cargo from the Philippines. A living adult of the colydiid Bothridères dontatus Chevr. was taken at New Orleans on June 1 under the bark of a mahogany log in cargo from Cuba.

Pathological interceptions of interest.--Aphelenchoides huntii Steiner was intercepted at Philadelphia on October 6 in sweetpotatoes from Sierra Leone, adding a new host and a new continent to our records for this nematode. Botrytis narcissicola Kleb. was intercepted on numerous shipments of narcissus bulbs from Netherlands during the season. Cercospora altheina Sacc. and a rust believed to be Kuehneola malvicola (Speg.) Arth. were intercepted on August 25 at Brownsville on Hibiscus syriacus from Mexico. A leaf disease of Odontoglossum from England intercepted at the Washington inspection house on September 19 was tentatively determined as due to Cercospora angreci Gaill. & Feuill. Cylindrosporium castanicolum (Desm.) Berl. was intercepted on September 23 at New York on Castanea sativa leaves from Italy. Ditylenchus dipsaci (Kuhn.) Filipjev was intercepted on September 14 at the Washington inspection house on Allium azureum collected in the wild in Netherlands. This host species name is invalid and a synonym of two species; which one is involved has not been learned. Guignardia aesculi (Pk.) V. B. Stewart was intercepted on September 11 at New York on horse-chestnut leaves from Nova Scotia. Heterodera marioni (Cornu) Goodey was intercepted on September 11 at San Francisco in Nepenthes ventricosa from the Philippines. Melanconium sacchari Mass. was found on sugarcane cuttings from Sierra Leone on October 17 at Philadelphia. Microdiplozia palmarum Died. on Chamaerops humilis leaves from Italy was intercepted on August 14 at New York. Peronospora pisi (DeBy.) Syd. was found in green peas in stores from England on August 3 at New York. Phoma conigena Karst. var. abieticola Sacc. was found on the scales of Picea excelsa cones in baggage from Germany on August 17 at New York. Phoma pomi Pass. was intercepted on September 25 at Brownsville in apples from Mexico. Puccinia gentianae (Str.) Link was intercepted at New York on June 27 on gentians from Switzerland. Puccinia tagetica Diet. & Holw. was intercepted at Brownsville on August 18 and September 16 on Tagetes being brought in as anise for medicinal use. A smut ball found among the florets of plants of Festuca sp. from Syria was intercepted on July 12 at New York. The smut spores were much like those of Tilletia vulipae P. Magn. Ustilago grandis Fries was intercepted at New York on October 16 on Phragmites communis from Netherlands.

DOMESTIC PLANT QUARANTINES

Chinch bug survey under way.--In order to obtain more definite data on chinch bug infestations which have been reported as occurring in considerable numbers in certain sections of the Midwest this year, a survey is being conducted, cooperatively with the States, to obtain information on the number of bugs that may enter hibernation. This information is needed to

aid in determining the possibility of these insects occurring in outbreak numbers next season. The States which are being so surveyed are Illinois, Iowa, Kansas, Nebraska, Indiana, Ohio, Missouri, and Oklahoma. In Illinois some work has already been done by the State, using a method developed there in recent years. The work in the various infested States is being organized on much the same basis as, and with personnel from, the grasshopper survey conducted this fall by the Division of Domestic Plant Quarantines. The technique utilized has been worked out by the Division of Cereal and Forage Insect Investigations of this Bureau, and personnel from that Division will cooperate in a technical advisory capacity during the survey and in analyzing the accumulated data. Twenty inspectors began the work immediately following a conference at Des Moines, Iowa, on November 8, which was attended by cooperators from Iowa, Illinois, Missouri, and Nebraska and by members of the Divisions of Domestic Plant Quarantines and Cereal and Forage Insect Investigations.

Grasshopper control headquarters moving to Denver.--General headquarters of the grasshopper control project will be moved from Minneapolis to Denver as soon as the final details of the current year's operations and the completion of the fall egg survey will permit. Denver was selected as new headquarters because it is centrally located among the 24 infested Western States in which control of these pests is necessary. A district headquarters will be maintained at Minneapolis. The grasshopper control project of the Division of Domestic Plant Quarantines, under the leadership of B. M. Gaddis, will be under the immediate supervision of W. E. Dove, as field project leader, as heretofore, and under the field directorship of Claude Wakeland, who also acts in a similar capacity over the Salt Lake City headquarters for Mormon cricket control. Office space at Denver has been obtained in the Insurance Exchange Building, 810 Fourteenth Street.

Baiting for lesser migratory grasshopper.--Farmers in the Texas and Oklahoma Panhandles continued to spread bait in October in two counties on the Oklahoma side and several in the Texas area. A little baiting was done in western Kansas for the protection of fall-sown grains and control operations were also continued in Yuma County, Ariz. Federal crews assisted in the work in Oklahoma. Many adults of the second generation of Melanoplus mexicanus Sauss. were present in the early part of October in the various above-mentioned areas, as well as in Nebraska. Freezing temperatures in the latter part of the month destroyed most of them, however, so that few 'hoppers of any species were present in any of the infested region by the end of October, except in Yuma County, Ariz.

Progress in grasshopper survey.--By the close of October the survey of grasshopper eggs throughout the 24 western States in which control operations were carried on in the past field season, was nearing completion, and the task of converting the data into bait-ton estimates for 1940 was well under way at the headquarters office in Minneapolis. For the purpose of devising means for more closely calculating these estimates, a meeting of project leaders and supervisors was held at Minneapolis on October 21 and 22.

Results of Mormon cricket control operations.--Activities for the control of Mormon cricket infestations were conducted in the current field season cooperatively with the States of Idaho, Montana, Nebraska, Nevada,

Oregon, South Dakota, Utah, Washington, and Wyoming, and scouting and control were carried on in one county of Colorado. The large reduction in the heavily infested and the moderately infested areas, principally in the States of Montana, Wyoming, and Idaho, may be attributed to the effective power-dusting program in those States. The decrease in Montana alone, which has been the most heavily infested State in the region, amounted to $3\frac{1}{2}$ million acres, reducing the total infestation from $7\frac{3}{4}$ million acres in 1938, to less than $4\frac{1}{2}$ million in 1939. Many areas formerly having heavy or moderate infestations were reduced to light infestations, and in some instances the crickets were so scattered that they no longer threaten crop lands.

October work on white-fringed beetle project.--Although 34 more properties in the vicinity of Monroeville, Ala., were found in October to be infested, white-fringed beetles on the whole were scarce throughout the infested areas. The field force devoted their energies principally to regulatory work. With the harvesting of peanuts and ginning of cotton comprising the chief activity of the rural population, and with nursery-stock shipping beginning in the New Orleans area, patrol inspection was conducted on lines of movement of regulated products. Cotton was fumigated, gin trash inspected, the movement of cottonseed to oil mills was checked with the cooperation of operators, and cars hauling cottonseed were inspected to insure removal of debris. At New Orleans visits in the interest of quarantine enforcement during the winter were made to packing houses, transportation lines, and concerns handling restricted products. Large shipments of plants arriving in the city from various parts of the United States are immediately placed in certified plunging units and held until subsequently reshipped. With the moving of a circus troop out of New Orleans, 6 inspectors were on the ground to see that tent stakes were free from soil and that no hay or other restricted products were being transported. In patrol activities in the New Orleans area in October, over 200 shipments were inspected; 42 were found to be certified, 58 were returned, 18 confiscated, and 86 inspected and certified on the highway. Most of the articles which had not been certified were moved by persons not familiar with the regulations.

Peach mosaic and phony peach control work.--Cooperative inspection for the phony peach and peach mosaic diseases, including the reinspection of nurseries and budwood sources in accordance with standard State quarantines, has been completed for the season in the various infected States, the work in October having been conducted in California, Georgia, Texas, and Oklahoma. In Texas the work has been broadened considerably this year, with 84 counties inspected. The conditions found there showed a checkered picture, with a 50 percent increase in the mosaic disease, and a 40 percent decrease from 1938 in the phony peach disease, as indicated by the number of diseased trees found. Although no peach mosaic was found this year in 4 previously infected counties of that State, the disease was located for the first time in 4 other counties. The phony peach disease was not found this year in 33 previously infected Texas counties. The work in Georgia was conducted in 71 counties during the season, with a reduction of 46 percent in the number of phony trees. Tree removal work in October was carried forward in the 4 above-named States, and in Alabama, Arkansas, South Carolina, Tennessee, and Utah, with the cooperation of the growers.

Phony peach disease reduced.--During the current field season, inspections for the phony peach disease were made in 422 counties. Previously infected properties, as well as those adjacent, were reinspected and the work was also extended into new areas. In the entire 12 infected States, over 58,000 phony trees were found--a reduction of approximately 33 percent from last year. Now that the inspection work has been completed, it is found that the number of counties formerly known to be infected but in which the disease was not found this year when inspected, totals 178.

Sweetpotato-weevil quarantined areas modified.--Since the measures for control and eradication of the sweetpotato weevil infestations were begun in July 1937, jointly with the States of Alabama, Georgia, Mississippi, and Texas, over 500 properties have been released by these States from the restrictions of their quarantines. The number released in each State is as follows: Alabama, 172; Georgia, 50; Mississippi, 280; Texas, 41; or a total of 543.

Work on the sweetpotato-weevil project.--Throughout the month of October, survey and inspection work was conducted in Alabama, Georgia, Mississippi, and Texas, with 13 Federal employees and 24 State men, the work extending into nonregulated areas. No weevils were found outside the present eradication and control areas. Injury caused to sweetpotatoes in Madison County, Tex., where it was rumored that weevils were present, was found to be due to an insect tentatively identified as Typophorus viridicyaneus Crotch. Measures for the eradication of weevils were carried forward, the States of Alabama, Georgia, and Mississippi employing W. P. A. workers to rid fields of volunteer plants. In Alabama 80 properties were so cleaned and 1,079 bushels of escaped tubers were destroyed. In Mississippi a host-free zone is being made along the coast adjoining the present eradication areas. Educational work was stressed in Baldwin and Mobile Counties, Ala.; talks were given before various groups; and at county fairs motion pictures and exhibits were displayed; with an inspector present for the entire 2 weeks, answering questions as to the weevils and their control.

Quarantine enforcement.--Transit inspection work in the month of October resulted in the interception of 266 apparent violations of quarantines. Summarized as to States to which these shipments were moving, it is found that with the exception of 1 State--New York--more violations were found consigned to California than to any other State. Of the 26 violations moving to California, 13 were intercepted at Chicago and the others at Kansas City, Omaha, Boston, Philadelphia, and New York. A shipment in violation of the white-fringed beetle quarantine, consigned to the State of New York, was intercepted at New York City. State inspectors of Illinois and Minnesota rendered assistance on the transit-inspection work in October, and Japanese beetle inspectors examined shipments in transit at Pittsburgh and New York. The State of California systematically reports all violations of Federal quarantines that reach that State, and Florida State inspectors at Jacksonville conduct transit-inspection activities for the enforcement of Federal and State quarantines.

Citrus-canker work stepped up.--With the approach of winter and the defoliation of trees facilitating the work of finding small escaped citrus trees in competing vegetation, the inspection personnel has been increased to 10, including 1 Texas State inspector and 3 from other projects of the

Division. The October work of inspecting orange and grapefruit trees in groves or dooryards in the city of Houston, Tex., and vicinity, and at League City, Tex., resulted in finding no citrus canker. W. P. A. laborers removed over 13,000 abandoned trees in October.

CONTROL INVESTIGATIONS

A method of applying rotenone-containing materials.--W. N. Sullivan, E. R. McGovran, and J. H. Fales, in cooperation with L. D. Goodhue, of Insecticide Investigations, have developed a method of applying rotenone and rotenone-bearing materials as insecticides. By this method the rotenone-containing material is first dissolved in a suitable solvent such as safrole or acetone, placed in a Devilbiss atomizer and sprayed on a hot plate. A temperature of about 400° C. is maintained at the point of contact of liquid and hot plate, which produces a dense smoke or fog containing the insecticidal material. A fan is used as an aid in distributing the smoke. Preliminary tests against the housefly indicate excellent killing power for rotenone applied in this form. An oleo resin containing 25 percent pyrethrins, alone and in combination with rotenone, also gave very good results. This method of application of rotenone has many advantages over other methods: (1) The smoke containing rotenone is very stable; (2) is not readily adsorbed on surfaces such as walls or floors; (3) high efficiency in respect to amount of material used and amount of solvent required; (4) probably less danger to health of plants; and (5) ease of confinement in respect to most other fumigants. Although this method is still in the experimental phase, it is believed that it has possibilities for use in the control of insects.

INSECTICIDE INVESTIGATIONS

Dennis patent on cube adjudicated.--In 1938 the American Cube Syndicate brought suit against L. E. Pitner and partners doing business as the Agicide Laboratories, Milwaukee, Wis., alleging infringement of United States Reissue Patent 18,667. This patent covers the use as an insecticide and vermifuge of ground cube root with the fibrous element removed. This reissue patent corrected information concerning the botanical origin of cube which was given in the original patent. This suit was heard in the United States District Court for the eastern district of Wisconsin at Milwaukee. N. E. McIndoo, R. C. Roark, John E. Dudley, Jr., of this Bureau appeared as witnesses to testify concerning the chemical and botanical relationships of cube (*Lonchocarpus*), derris, and tephrosia, the early use of cube as an insecticide, and its present large-scale use, especially against the pea aphid. The judge ruled in favor of the American Cube Syndicate. An appeal was taken which was heard in the United States Circuit Court of Appeals for the Seventh Circuit in Chicago, Ill. The Circuit Court overruled the decision and decided that the Dennis patent was void for lack of originality on the part of the patentee and for lack of invention over the art. The American Cube Syndicate petitioned the United States Supreme Court for a writ of certiorari in this patent action, but on November 7, 1939, the Supreme Court refused to review the case. Thus the final word has been said in this case. The final adjudication of this patent is of considerable interest to entomologists, inasmuch as about 2,500,000 pounds of cube are imported annually for use in the preparation of insecticidal dusts and sprays. The American Cube Syndicate, owners of the patents, had been demanding a royalty of 1 cent a pound for the use of cube as an insecticide, and

on January 1, 1939, had increased this royalty to $1\frac{1}{2}$ cents a pound. The saving to the American public by this decision, declaring the patent invalid, amounts to at least \$25,000 a year.

BEE CULTURE

Parafoulbrood organism found in comb from Indiana.--The first instance in which Bacillus para-alvei, the causative organism of parafoulbrood, has been definitely identified in a disease sample sent to the Beltsville, Md., laboratory from a northern State occurred in September. The sample originated in Indiana. This disease had previously been reported only from limited sections of North Carolina, South Carolina, Georgia, and Florida. The first detailed description of parafoulbrood was made as the result of a cooperative investigation by the Bureau and State Plant Board of Florida a few years ago. A complete history of the Indiana case has not yet been obtained.

IDENTIFICATION AND CLASSIFICATION OF INSECTS

European ground beetle reported from North America.--On at least two occasions during the past year quarantine inspectors at Seattle, Wash., have taken the European carabid Acupalpus meridianus (L.) on cargoes of British ships from Canada. So far as known, A. meridianus has not heretofore been reported from North America but, in view of the circumstances under which the Seattle interceptions were made, it seems probable that the species is established in southwestern Canada and possibly also in northwestern United States. This ground beetle is widely distributed in Europe, but appears to be of no particular economic significance.

A new cecidomyiid pest of phlox.--Late in 1937 some Cecidomyiidae were received from C. R. Weiswander, of the Ohio Experiment Station at Wooster, Ohio, with the report that considerable damage was being caused to phlox by these insects. Definite identification could not be made on the basis of the original material and a number of lots were submitted by Dr. Weiswander subsequently, accompanied by detailed notes on field and laboratory observations. The early sendings were found to consist of a species considered predatory, rather than phytophagous, and it was thought possible that some form other than a cecidomyiid might be responsible for the injury. More recently, however, Dr. Weiswander has succeeded in obtaining a phytophagous cecidomyiid also in the course of his rearing work. He has, furthermore, determined that the latter is definitely responsible for the injury to phlox and has supplied some excellent series of both species with associated larvae. After extended study of this material, C. T. Greene has concluded that both forms are undescribed.

Review of a genus of hymenopterous parasites.--G. Stuart Walley, of the Division of Entomology, Canadian Department of Agriculture, has recently returned the National Museum specimens of the ichneumonid genus Camponolegi-
dea, having just completed a revision of the North American species. Mr. Walley recognized 80 species of Camponolegi-
dea, of which the Museum has representatives of 66 species. Of these 66 species, 33 are new and are all represented by type material, 20 by the holotypes.

Notes on the National ant collection.--One of the largest and most valuable collections of ants recently received by the National Museum on an exchange basis was that sent by John Clark, of the National Museum of Melbourne, Australia. It totaled 145 species of Australian ants, of which 120 were new to our collections, and 26 were represented by paratypes. A recent and very interesting discovery was the finding in the old Theodore Pergande collection of the National Museum of a single worker of an inquiline ant, Epipheidole inquilina Wheeler, formerly believed to be workerless. From available information it appears that the ant was collected at West Point, Nebr., by Lawrence Bruner. The genus Epipheidole was created by Wheeler for specimens of inquilina (male, queen) which he found living in several nests of a harvesting ant, Pheidole pilifera var. coloradensis Emery, near Colorado Springs, Colo.

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